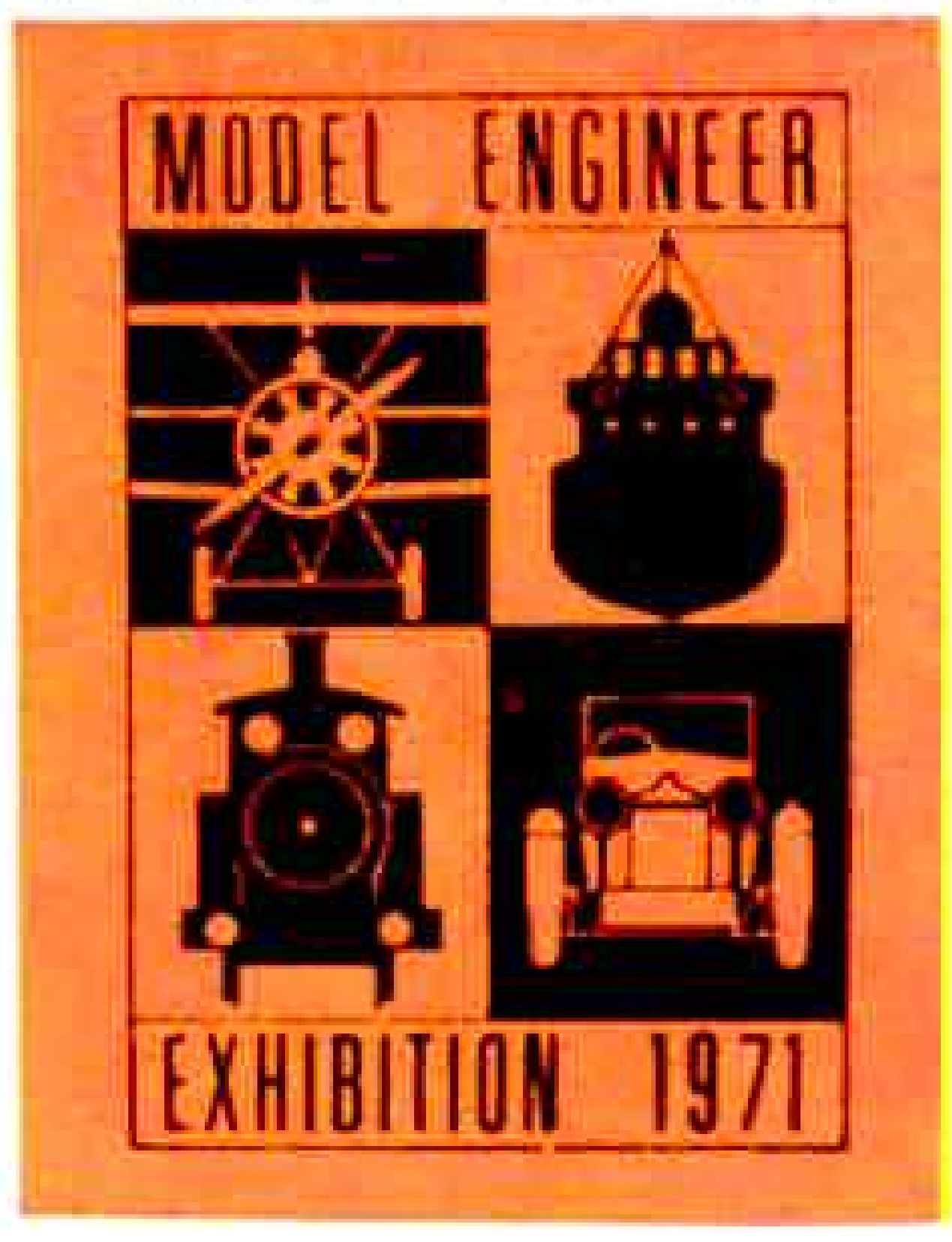
# MECCANO® Magazine

DECEMBER 1970



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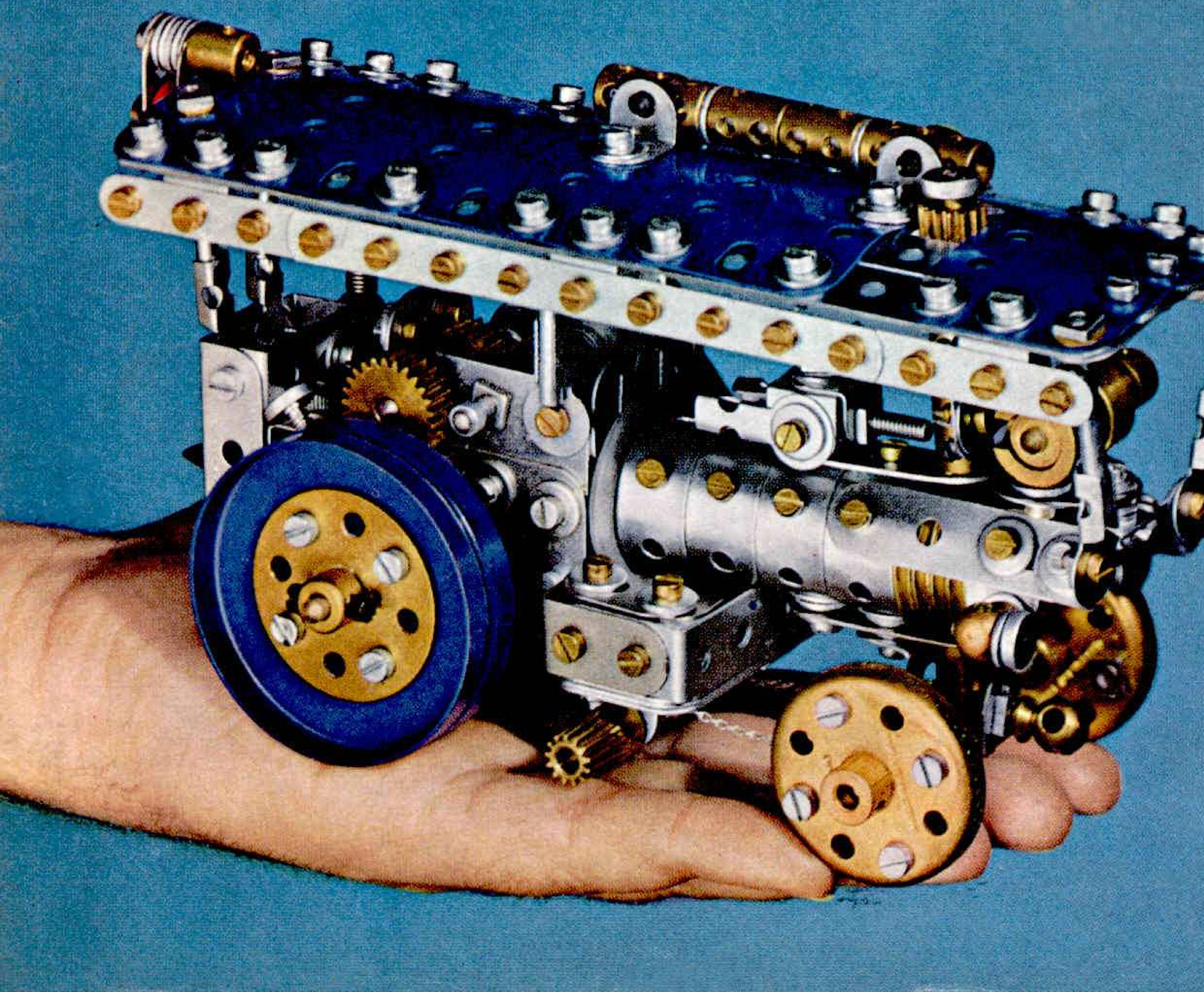

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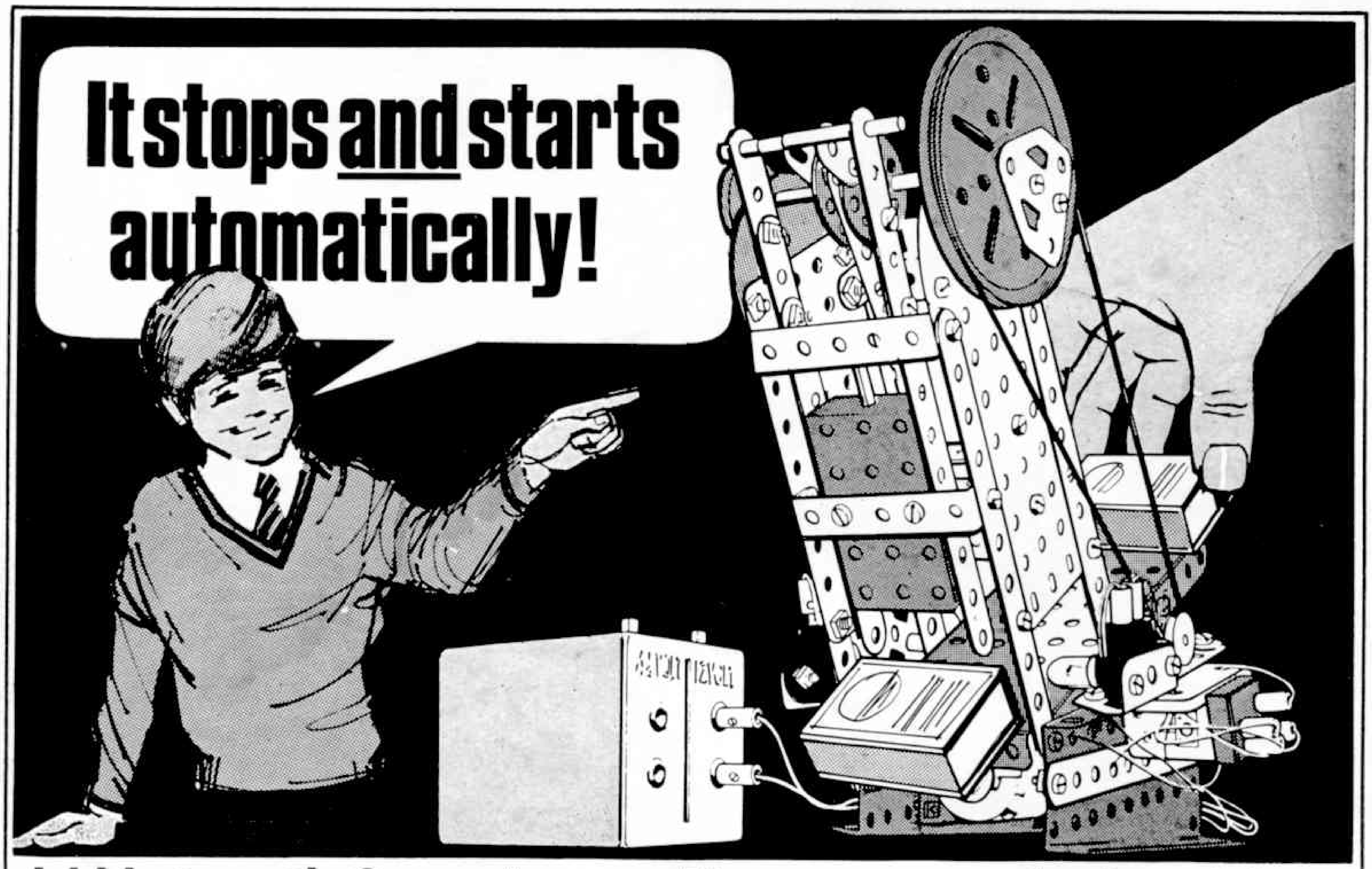
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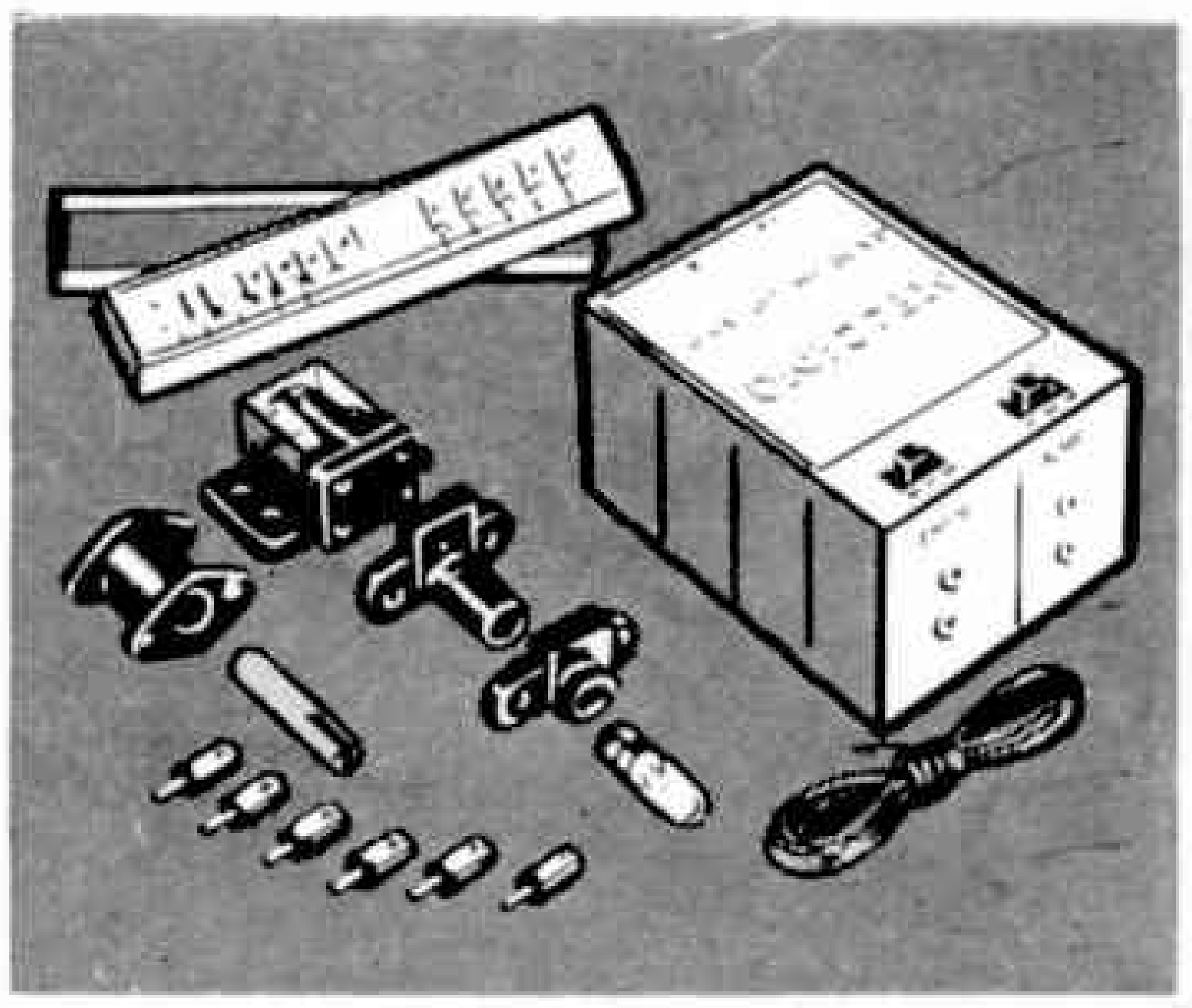

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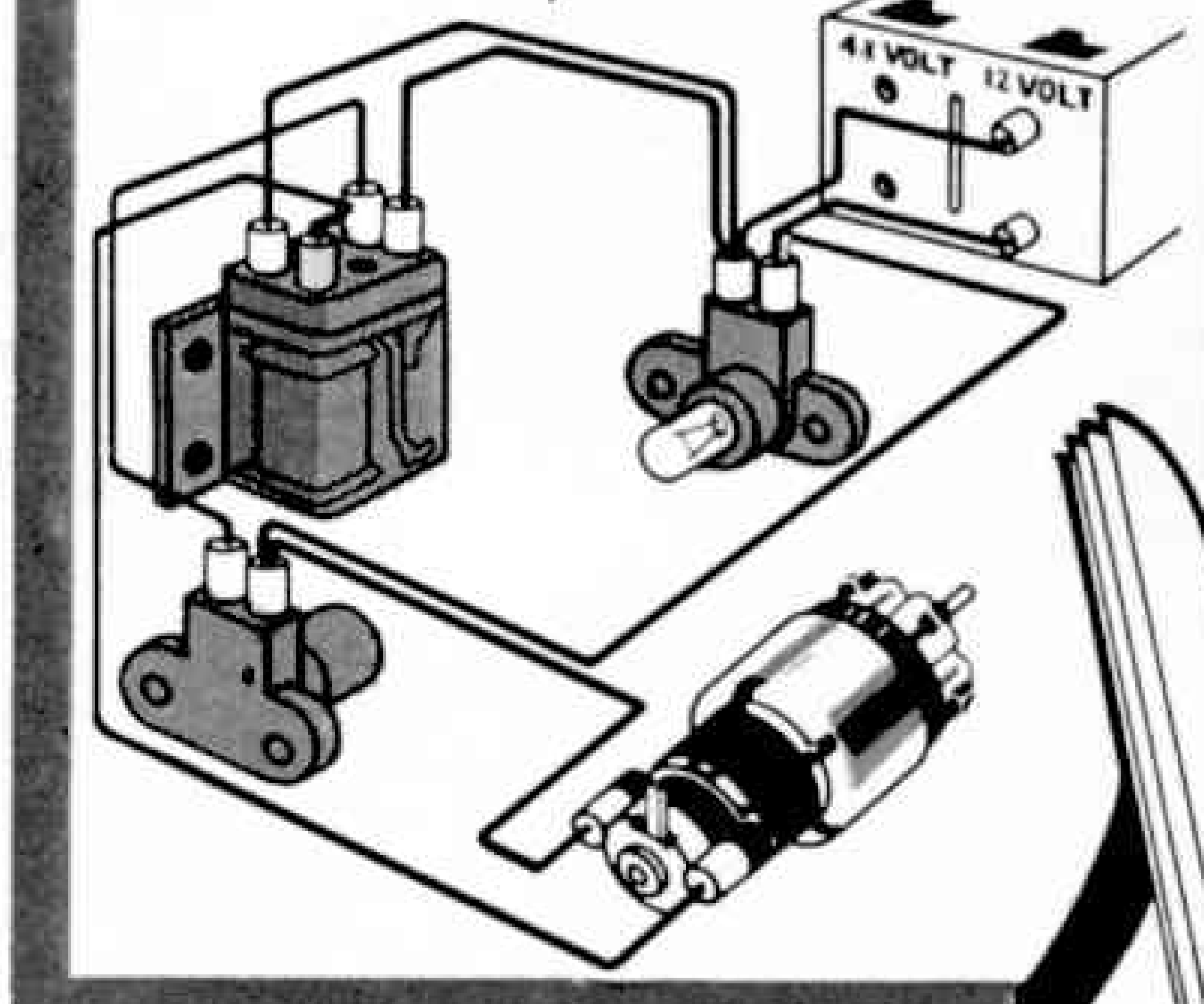
This set includes a battery control box, an electronic eye that acts as an automatic switch, a relay, solenoid, bulb holder, plugs and wire. (motor not included).



## See how Electronic Control works with the Automatic press

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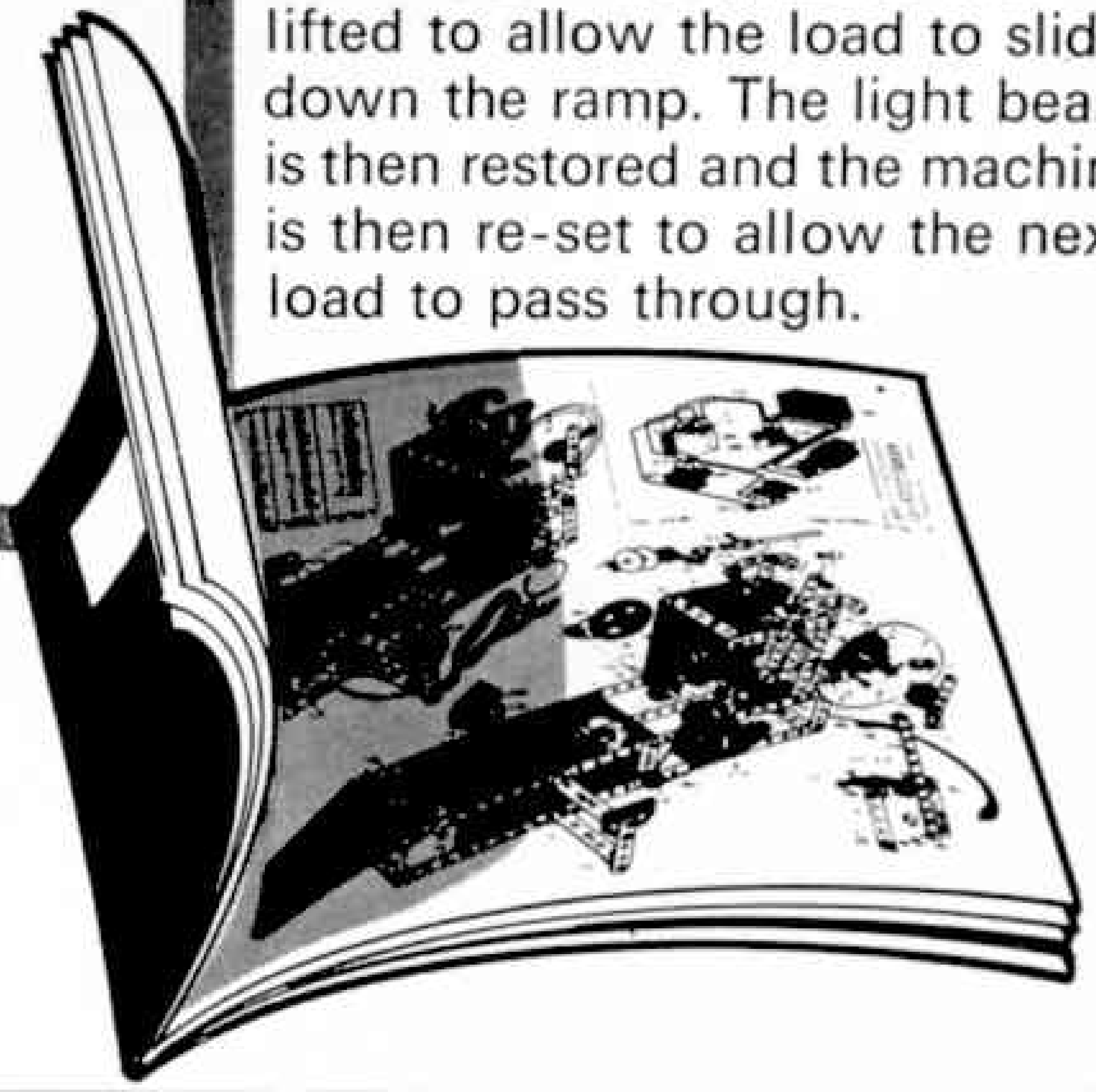

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# MECCANO® Magazine

DECEMBER 1970 VOLUME 55 NUMBER 12
Meccano Magazine, founded 1916.

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## FRONT COVER

Regular readers will have no trouble in seeing that the subject of this month's cover is the magnificent little Showmans Traction Engine designed and built by Mr. H. J. Halliday which won the Meccano Cup at this years Model Engineer Exhibition. Photograph supplied by MECCANO Tri-ang LTD.

## NEXT MONTH

Our December issue saw the last instalment of Bert Love's "Meccano Constructors Guide" which vacates no less than four pages for us to describe new models. Putting the space to good use from the start, 'Spanner' will be describing a Platform Sweeping Model aimed at the advanced modeller; and for younger builders, a breakdown track from a No. 4 outfit.

The new Meccano Model Building Competition will be outlined and we are told that this year over £75 in cash, plus lots of the new Meccano Outfits are waiting to be won!

On a more general side the departure next month of both 'Battle' and 'Militaria' means that we have room to include a truly wide variety of features in our first issue for 1971. Popular contributors such as Arthur Grant, Richard Lee and Trevor Holloway plus many others all help to ensure that it will be a cracking start to the New Year.

Advertisements and Subscription Offices: Model & Allied Publications Ltd., 13-35 Bridge Street, Hemel Hempstead, Hertfordshire. Tel.: Hemel Hempstead 2501-2-3.

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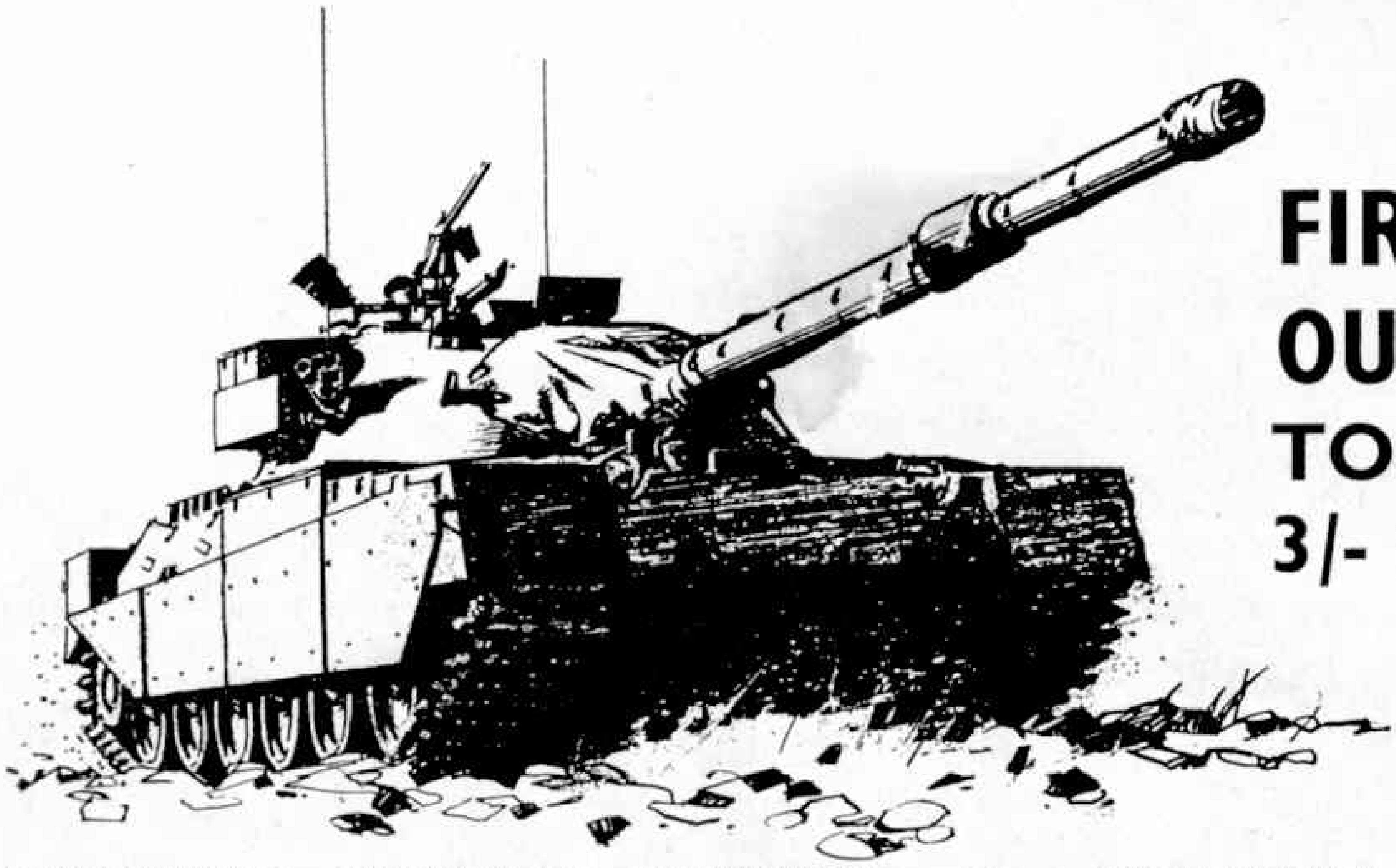

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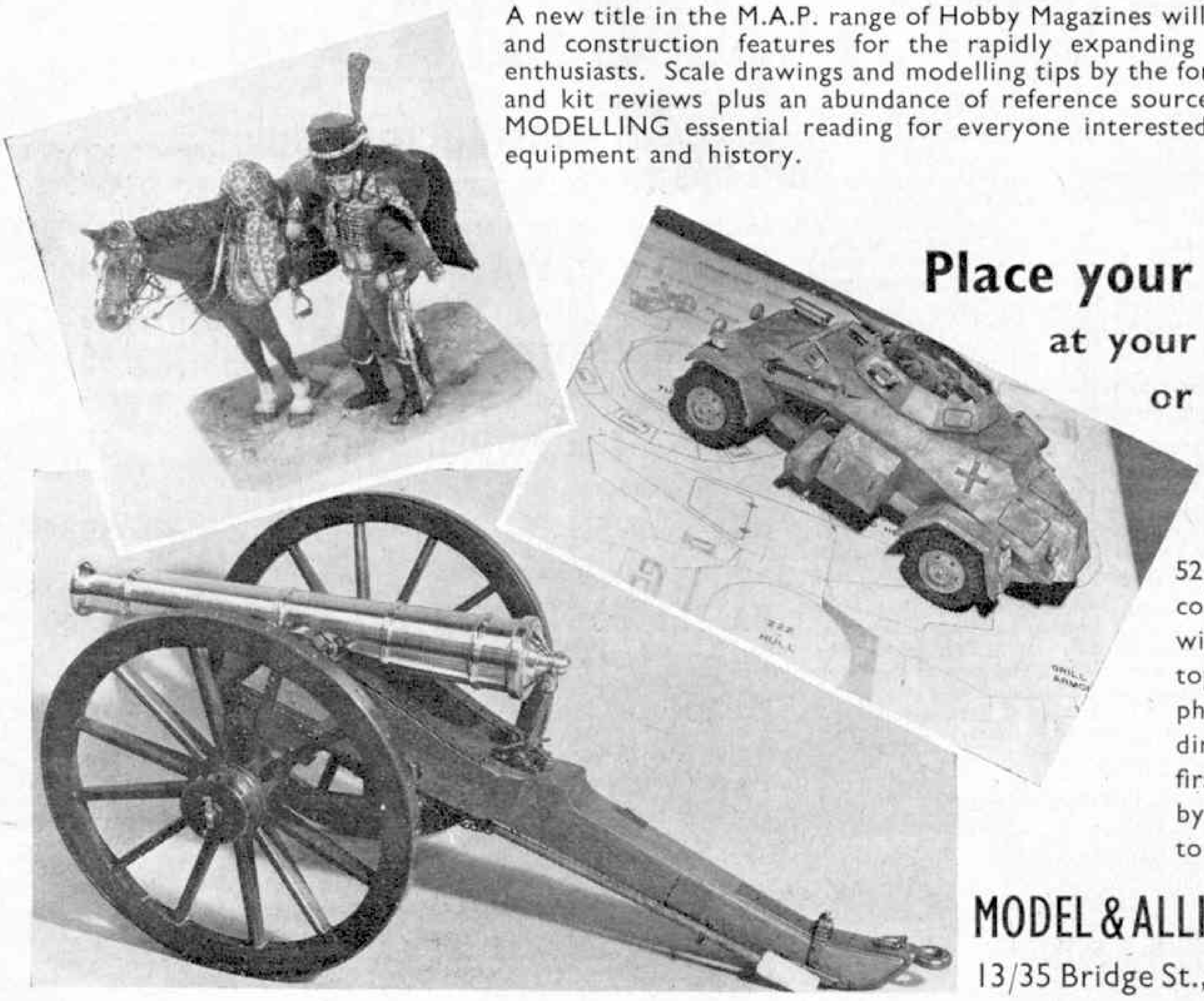

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MODEL ENGINEER

EXHIBITION 1971

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# 40th MODEL ENGINEER EXHIBITION

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## 29 Dec. '70 — 9 Jan. '71

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## Model Boats, Cars
## Aircraft, Locomotives
## Traction Engines
## Military Models
## Crafts

### SPECIAL ATTRACTIONS

Last year's popular pool with working space around will be there again—located in the centre of the main hall. Aircraft will again be showing their paces above the pool. Boats will be available for visitors to try . . . The Society of Model and Experimental Engineers will be operating their famous passenger carrying model steam locomotives—some wonderful models at work under the direction as ever of Mr. Bill Carter. Other models under compressed air in action.

NEW ! A demonstration of steam ploughing by model traction engines (even better than when shown on TV !). The ECRA Championship car circuit (a little tight for room last year) moves into a larger hall. Longer track, more spectator space. Jock Thin and Dick Smith welcome you again.

Other new attractions will include model soldiers, guns, dioramas. Display of woodwork and craft items. Demonstrations of various kinds. Small lecture theatre for film shows, model subject talks.

### SEE & BUY

Full model trade support with well stocked stands. Stands have been taken by Beatties of London, Model Hobby Consortium, Myfords Ltd., Graham Farish Group Sales Ltd., The Turntable, Kennions, Traction Engine Enterprises, Wall Models, Historex, Mainstream Productions Ltd., Plaistow Pictorial, with others to follow . . .

### SOUVENIR GUIDE

Another CHRISTMAS EXTRA issue of *Model Engineer* will be coming out 2nd Friday in December with entries, trade stands, articles galore to assist the visitor and solace the stay-at-home.

### FEATURES

RADIO CONTROL POOL
CAR RACING CIRCUIT
MODEL STEAM PLOUGHING
PASSENGER RAILWAY
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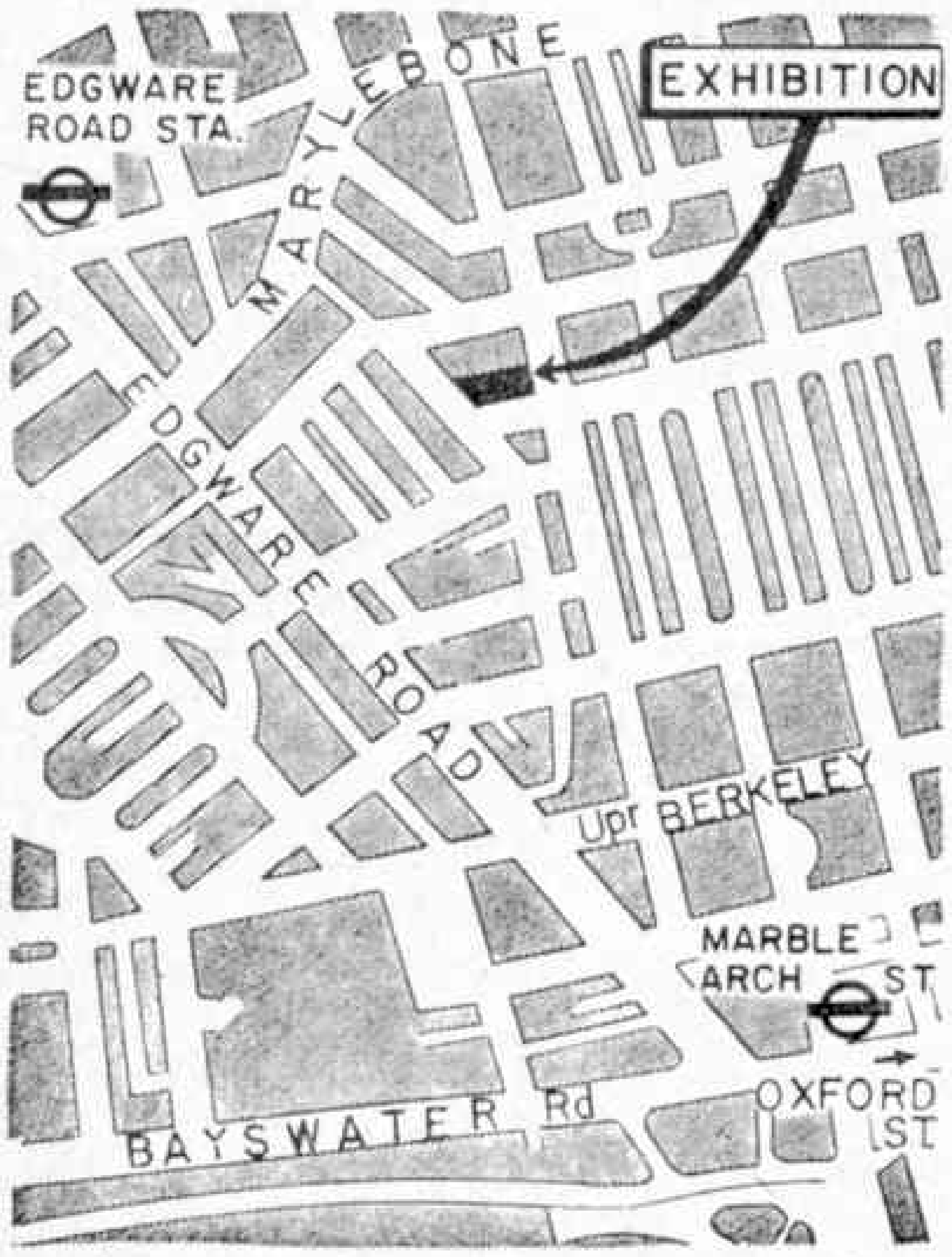

### PARTIES

Many clubs will be organising parties to come. We shall be very happy to welcome them, give them reduced price bookings, also book up party lunches, teas or other meals well in advance.

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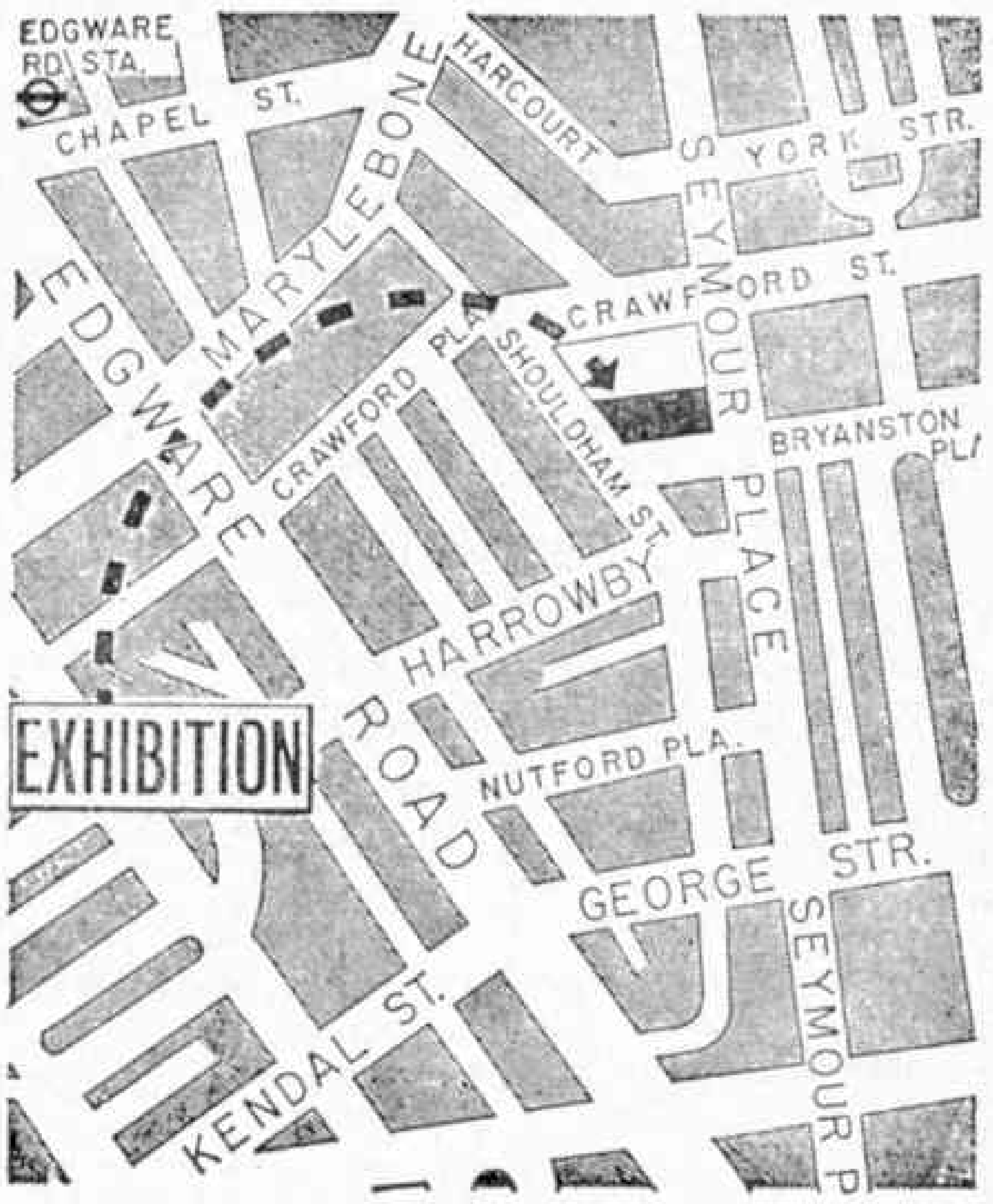

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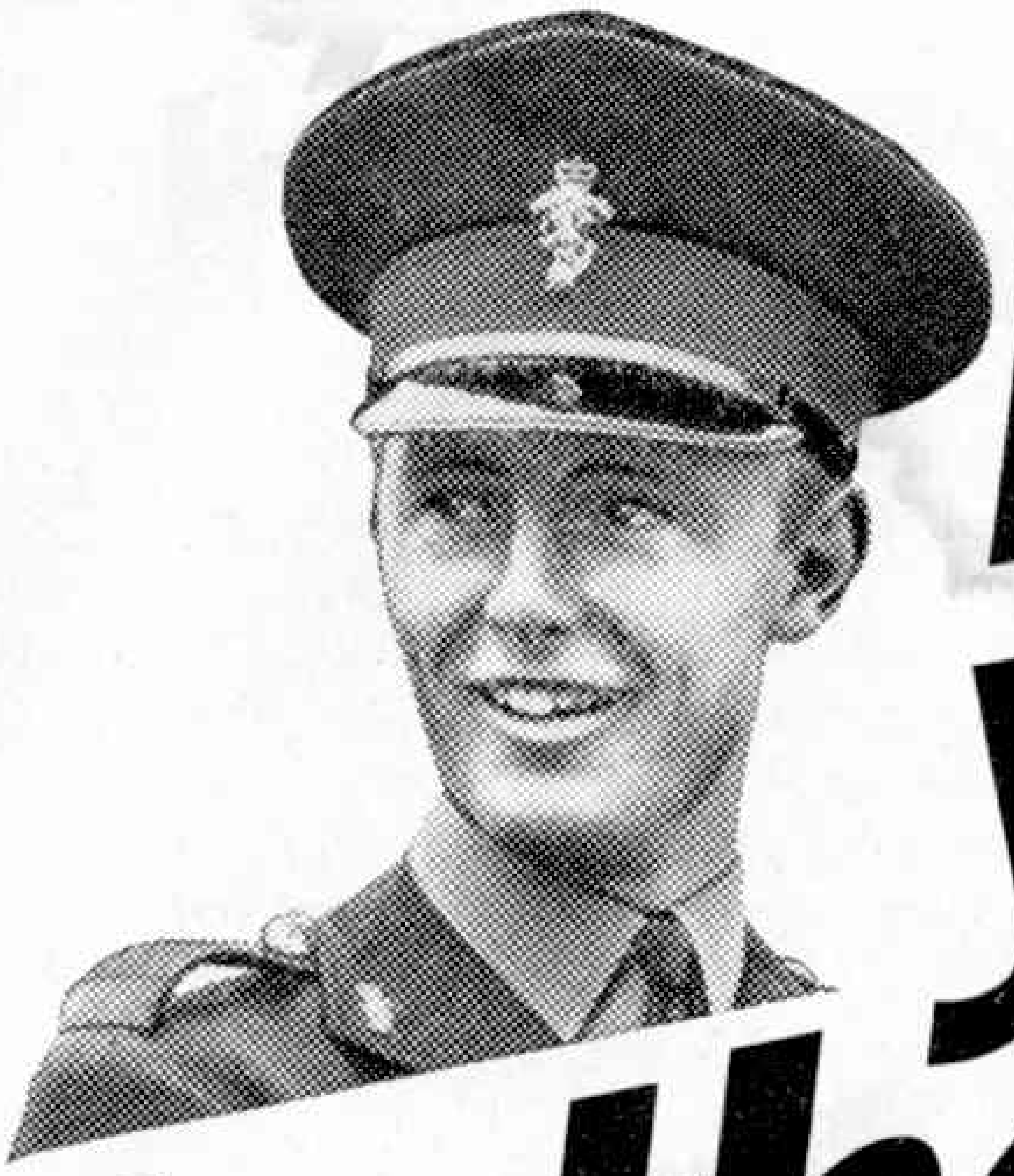

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| MILITARY MODELLING | 4th Friday |
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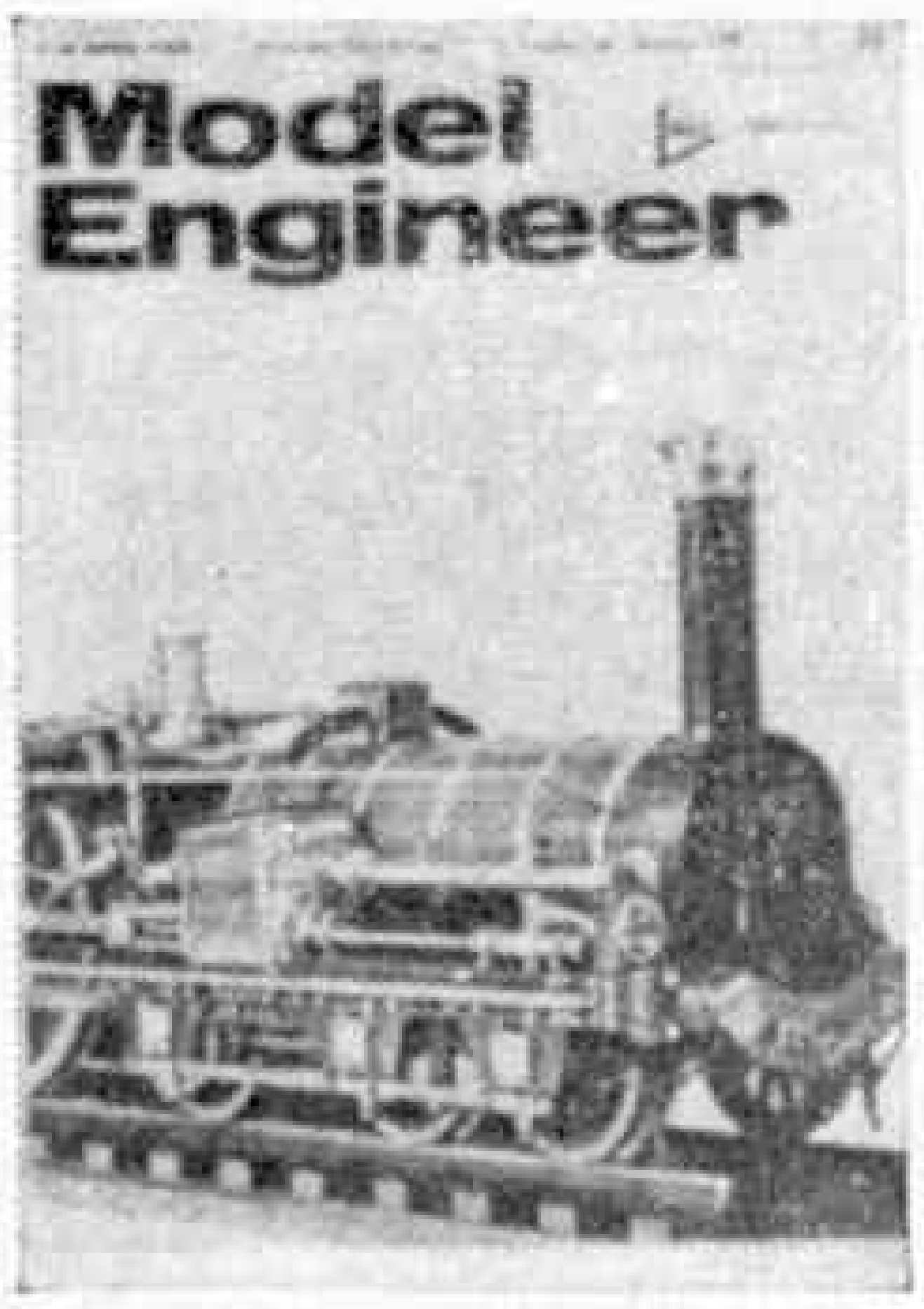


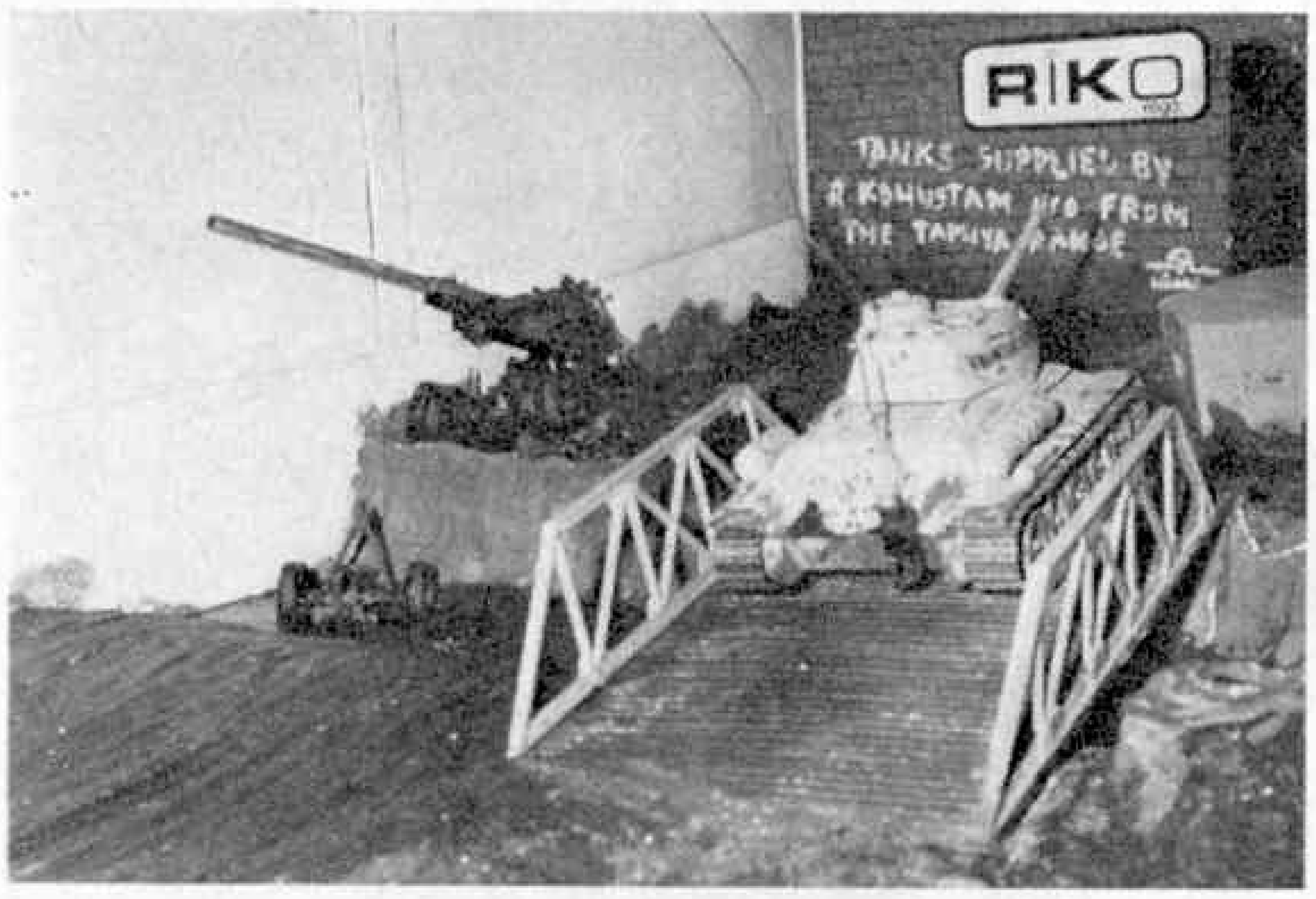
# ON THE EDITOR'S DESK

### M.E. Tank feature

I thought readers may be interested in seeing and hearing a little more about our remote controlled Battle Courses which are to be featured at the forthcoming 1970 Model Engineer Exhibition.

Last month, I outlined briefly how they worked and the accompanying photograph shows a Tamiya Russian T.34/85 32 Ton World War 2 Tank negotiating a narrow Bailey Bridge over a ditch on its way through the ruined walls at the far end of the course. The fine wires rising vertically from the rear of the tank provide the power via the hand control levers to the two driving motors in the tank. Directional control is obtained by reversing one track and driving forward on the other.

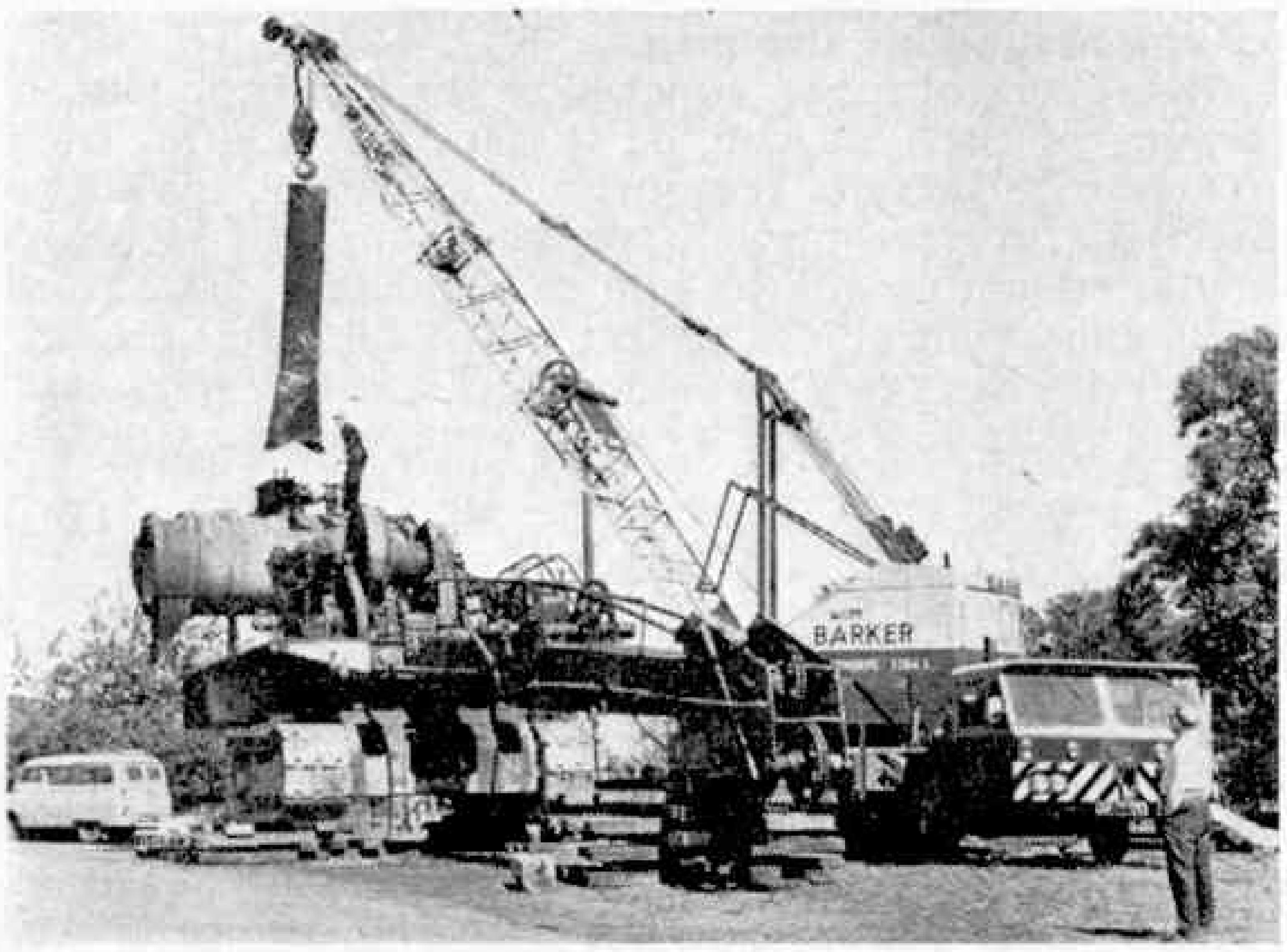
Its popularity here at the offices has necessitated its removal for fear of it wearing out before it even gets as far as the Exhibition !



### Veteran steam ' Navvy ' to work at museum

The last steam excavator of its type still in working order will be one of the main exhibits at Beamish North of England Open-Air museum near Newcastle when it opens to the public next spring.

The machine was built by Ruston-Bucyrus of Lincoln in 1931, and weighs 100 tons. It worked at a quarry in Hessle, Yorkshire, until recently and was purchased by the Industrial Steam Preservation Group from its original owners, now part of Associated Portland Cement Manufacturers Limited. It is to be restored at Beamish by the Preservation Group and will be a working exhibit of quarrying practice of the period.

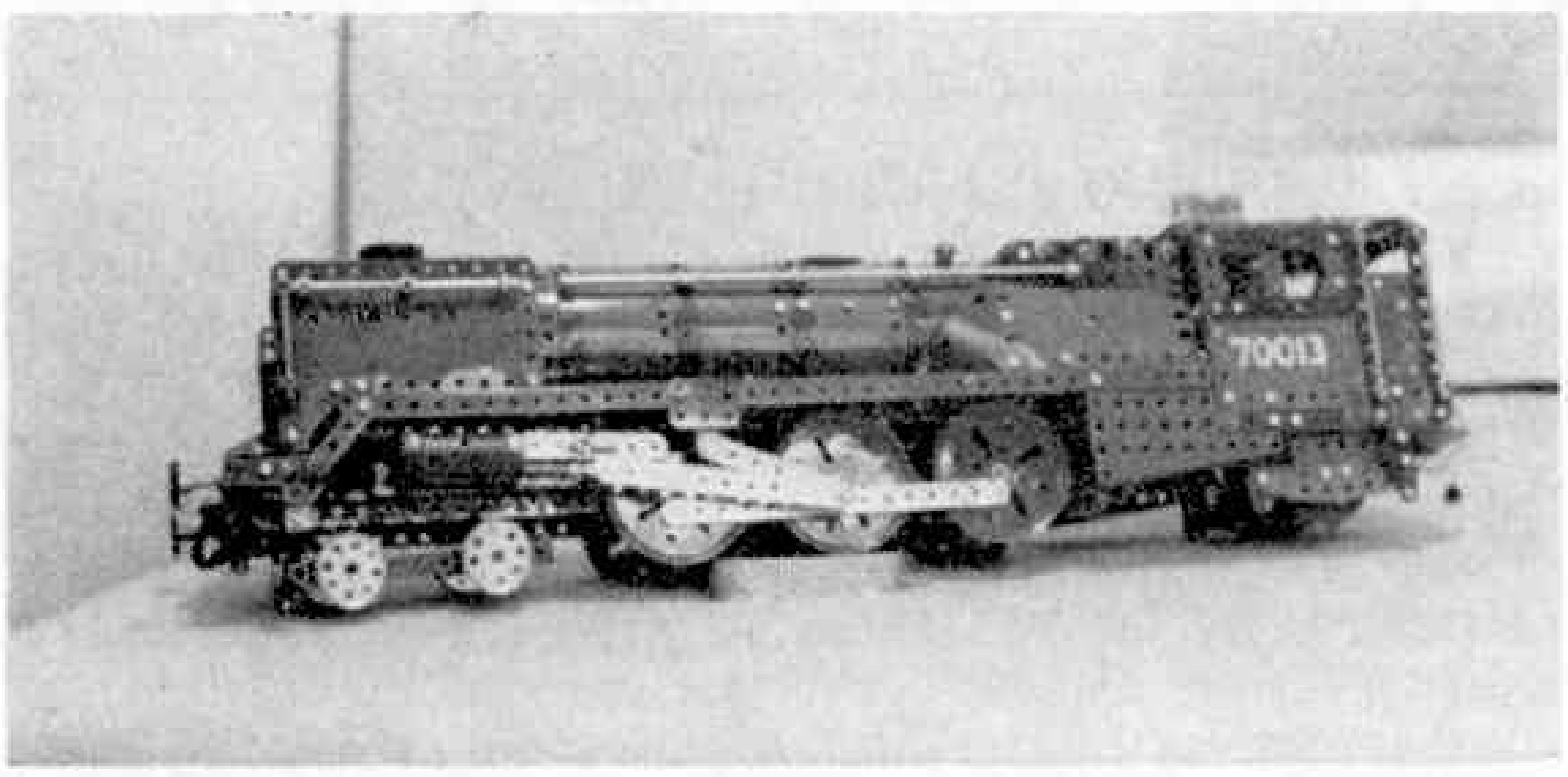


Restoration is being financed by the museum authorities with grants from the Victoria and Albert Museum and Ruston-Bucyrus.

The excavator is a Ruston No. 25 steam shovel of $3\frac{1}{2}$ cubic yards capacity. It was designed by the excavator division of Ruston & Hornsby Limited of Lincoln in 1926 and was the last of seven machines of this type to be built. Ruston-Bucyrus Limited was formed in 1929 when Ruston & Hornsby combined with the American Bucyrus-Erie Company to create a jointly owned excavator subsidiary.

### Contest '70

You may be wondering why we have included the photograph of Miss Heather Burton's prize-winning Locomotive on this page, incidentally. Well, in his feature on the Contest '70 results last month Spanner referred to the photograph, but, as you may have noticed, the photograph wasn't there ! This was the result of an unfortunate block mix-up which occurred when the November issue was being made up, so we thought the least we could do to calm Spanner's ruffled spirits was to give the photograph a special showing here. Our congratulations on a fine model, by the way, Heather.

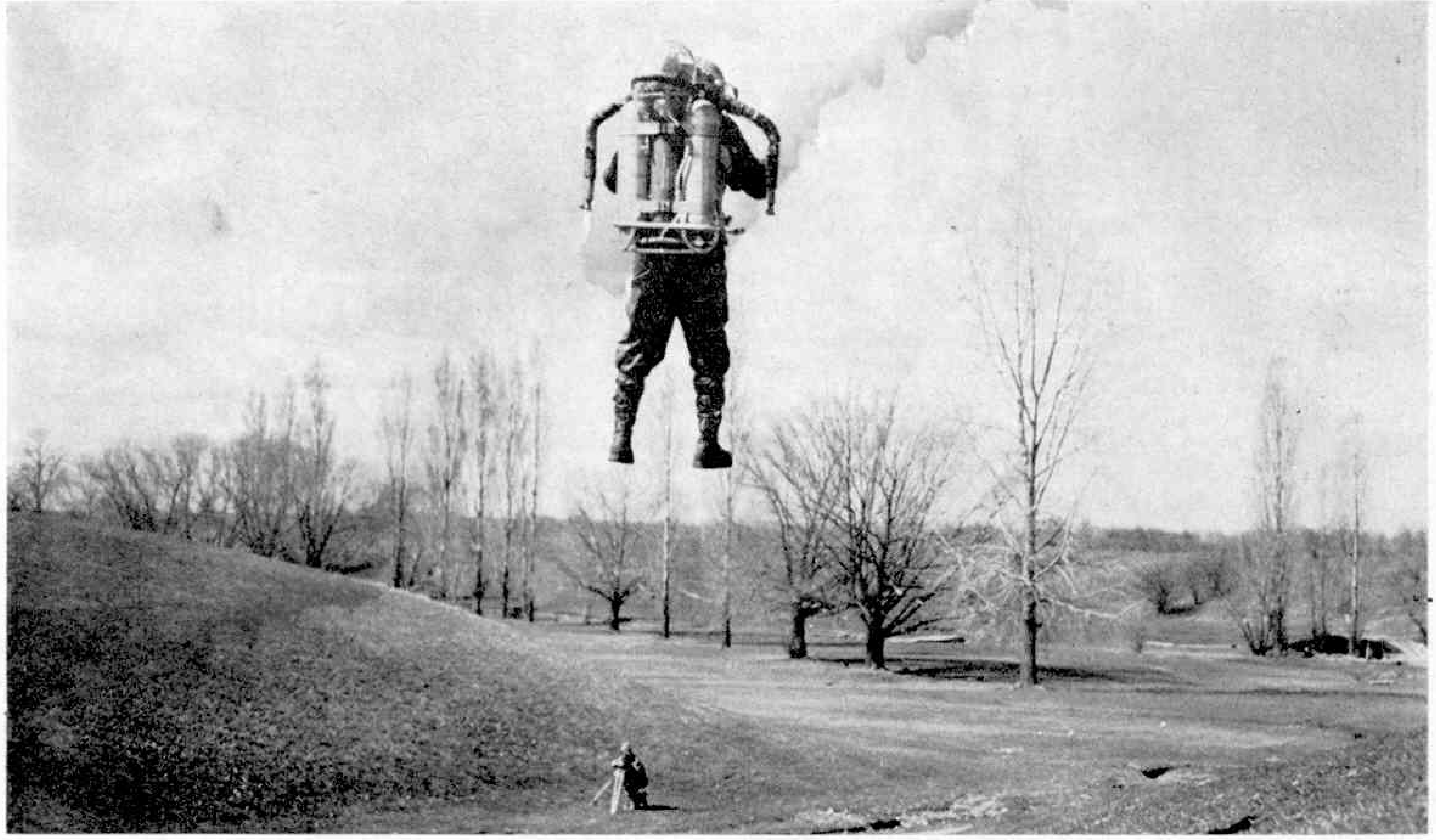


## NEW MAGAZINE

Making its debut in December is a brand new monthly magazine entitled ' Military Modelling '. Published by Model and Allied Publications its purpose will be to cater for the rapidly growing interest in the activities of the armed forces.

There will be features on Wargaming, plastic kit construction (including boats, aircraft, A.F.V's, etc.), model soldier collecting, plus general interest features all of which will have a military bias.

The first issue to appear will be on Monday the 18th December, so Military minded modellers, take note !



# FLIGHTS OF FANCY

### by Donald S. Fraser

ANOTHER SCIENCE-FICTION DREAM is becoming true. But, like all modern inventions in these space-age days, it still takes time to perfect the impossible.

This particular problem concerns flight. Having reached the moon; super-speeded all sound barriers; solved the difficulties of transporting great numbers of passengers, at one time, by air—what is left? For man to fly on his own, without wings, or anything too cumbersome to hinder him. Tentatively, it's been done.

Not too many years ago, scientists and aeronautical engineers experimented with a type of 'rocket belt' which would enable a chap to fly over the ground on his own. Today, this once far-fetched flight-of-fancy has now become a flight-of-fact. It has been done.

Aided by this new device, man-flights over the earth's surface, supported only by portable rocket equipment, have been accomplished. These early feasibility models were designed to prove that lightweight rocket power can lift a man and transport him over ground in controlled flight. The technical director of this project explained that only available components were employed since they were trying to prove the man-rocket concept and not shooting for maximum performance.

The weight and performance details (thrust levels and operating duration) have not been disclosed, but the rocket operator is able to carry the necessary equipment on his back.

Basically, the man-rocket consists of a twin-jet hydrogen peroxide propulsion system mounted on a fibreglass jacket, moulded to fit the back and hips of the operator. The operator slips his arms through padded lift rings, attached to the jacket. He then secures the unit with two quick-release safety belts passing around his abdomen.

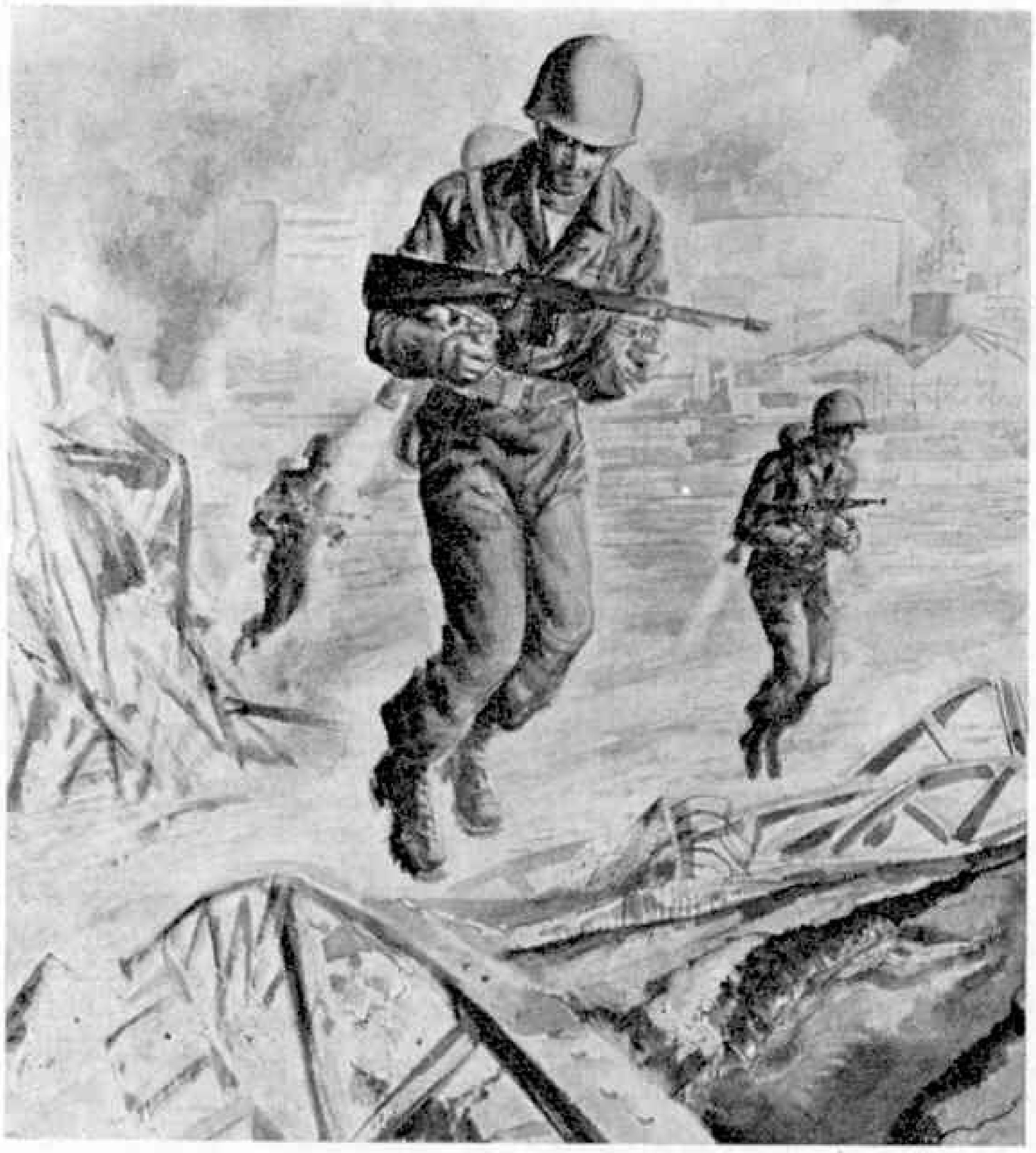
Metal control tubes, attached to the lift rings, extend forward on each side of the operator. A control stick on one tube permits the operator to change his flight direction. A motorcycle type hand throttle mounted on the other tube allows him to regulate rocket thrust levels thus controlling his rate of climb and descent. The device has proven so stable in flight that pitch and roll are easily controlled by movements of the operator's body.

This rocket propulsion system is fully throttleable. When activated by the pilot's controls, hydrogen peroxide is forced under pressure into a gas generator where it contacts a catalyst and decomposes into steam. The steam escapes through two rocket nozzles providing thrust. Main thrust from the nozzles is directed toward the ground while jet reflectors provide thrust for yaw control when activated by the operator. Position of the rocket nozzles and the low temperature of the steam exhaust eliminate the need for special protective clothing to shield the operator.

This ingenious device has been likened to a pogo stick owing to its present limitations. It can only be used for short hops at present. This will certainly be rectified in the future.

While man-rockets were not specifically designed for military purposes, the United States Army have studied applications for operational units that will be further developed. The most frequently mentioned use of man-rockets would be to transport infantry over surface obstacles such as rivers, ravines, barbed wire and mine fields. They could also be used during amphibious operations permitting assault troops to fly from ship to shore. They would be an asset in reaching the top of vertical obstacles such as cliffs.

Another possibility for this vehicle is in space. Many methods of lunar transportation are being studied today, among them this rocket-driven device. It would certainly assist astronauts to traverse difficult terrain and climb in and out of deep craters.

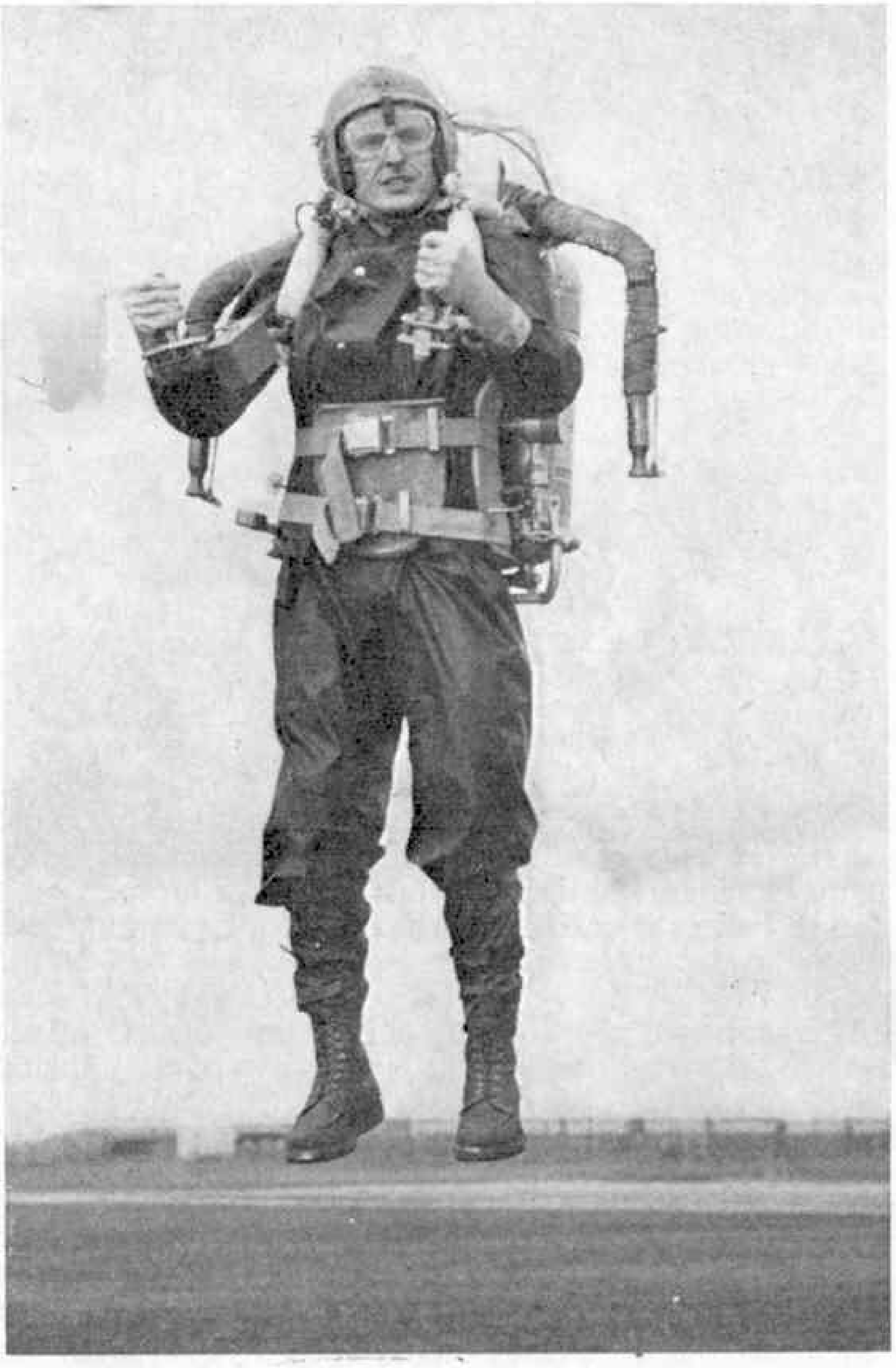


**An artists impression of soldiers employing the rocket belt for specific military requirements.**

In actual fact, a two-man model of the earlier version is being developed especially for space exploration. In this instance, the two men stand on a platform with most of the equipment between them. The flight controls are handled by the pilot in front.

Getting back to earth, as it were, what enormous probabilities the future holds for this incredible invention. Its possibilities are countless. With this clip-on power pack one could travel 30 or 40 feet high, at reasonable speeds of 30 or so m.p.h., duck all traffic and parking problems, ignore such things as trains, buses and other public transport and, literally, feel as free as the birds of the air, with little, or no, restrictions.

Personally, it can't happen too soon, as far as I am concerned. I've always wanted to have that 'above it all' feeling.



**A close-up view of the rocket belt undergoing trials. It is controlled by two handles which pass under the arms and the complete unit is strapped to the operator rather like a rucksack.**

**Crossing a river with the experimental rocket-belt. During free flights tests, ground and water distances up to several hundred feet have been covered.**

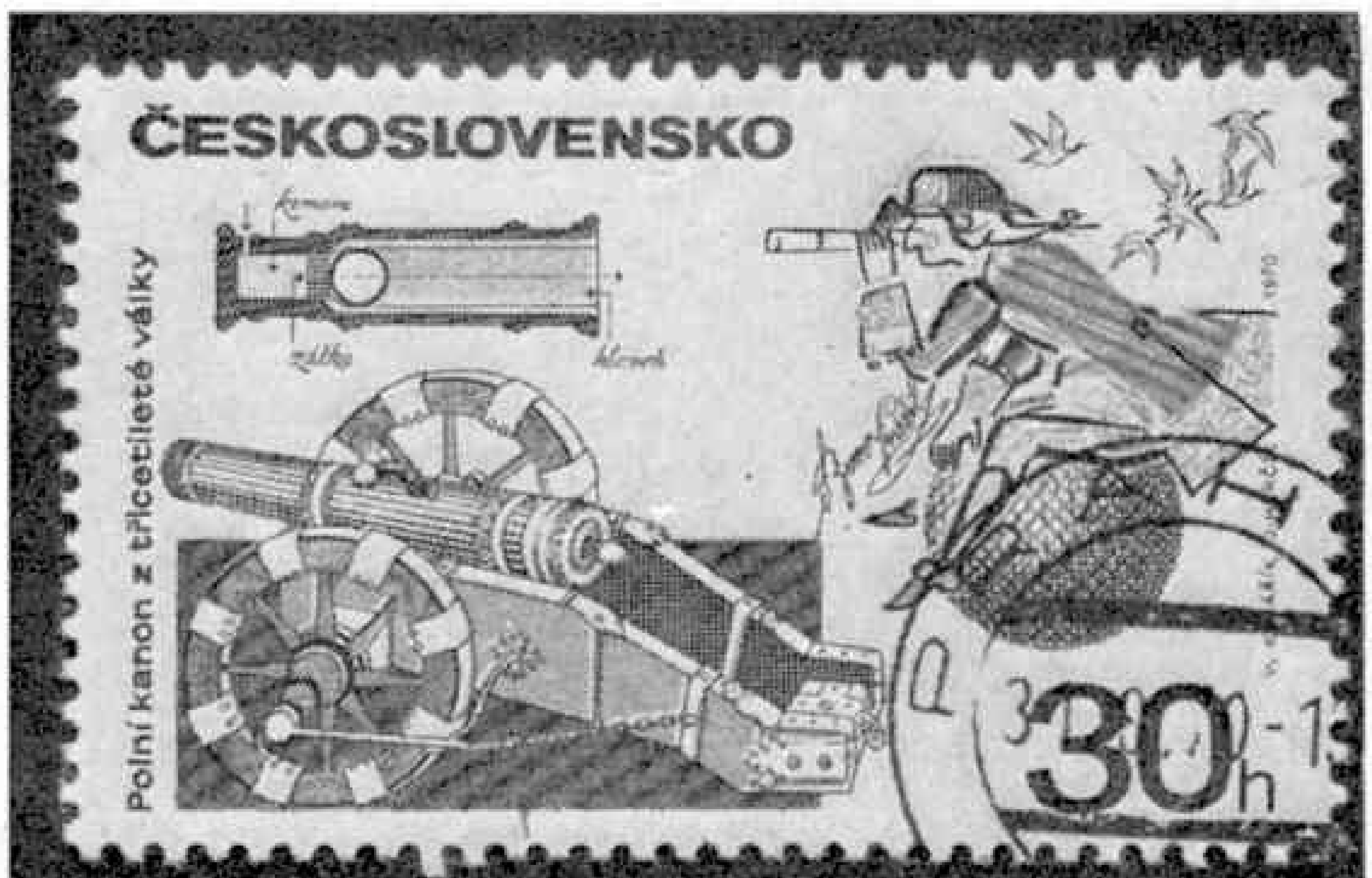
# HISTORIC FIREARMS ON STAMPS

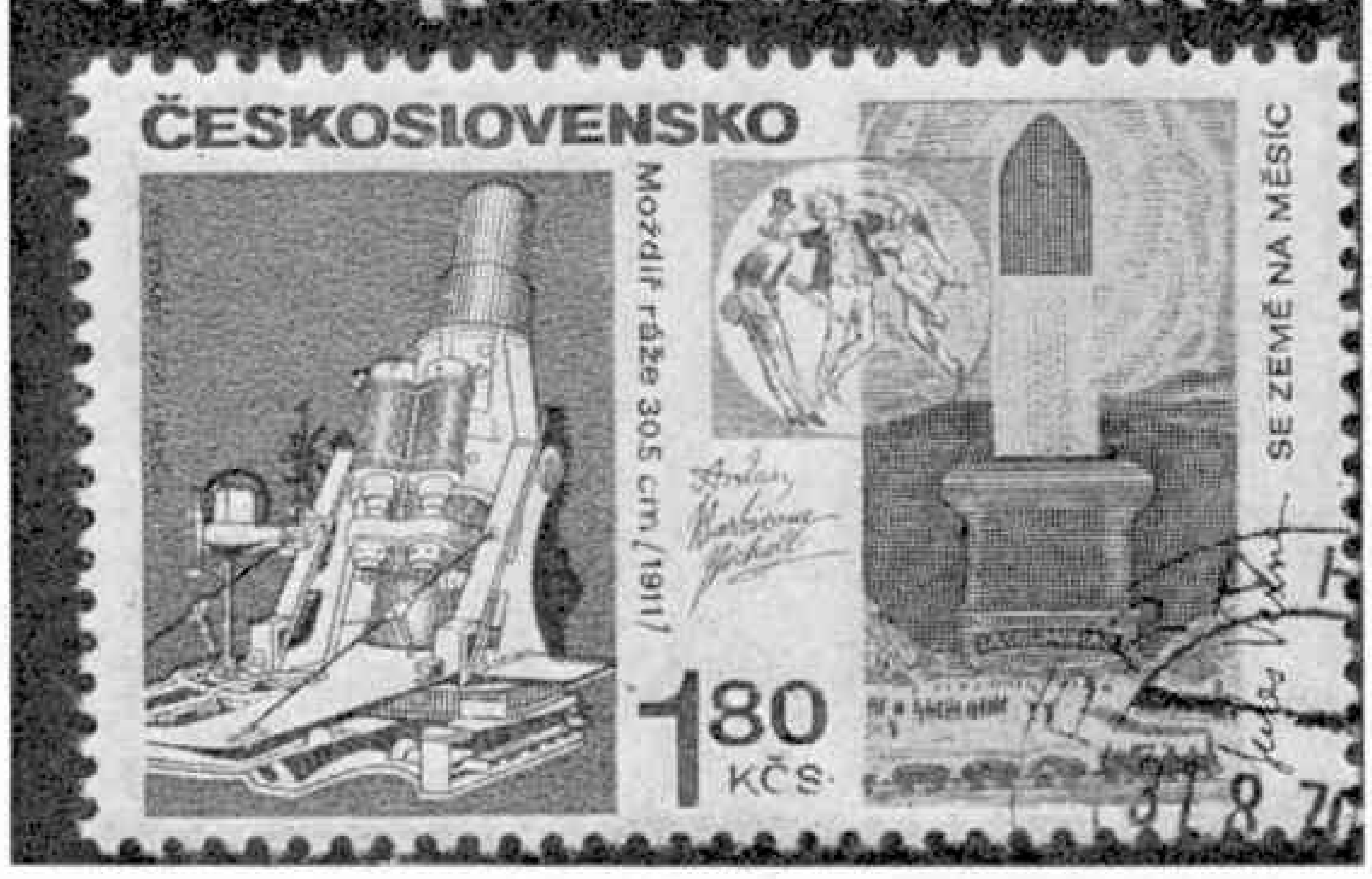
James A. Mackay

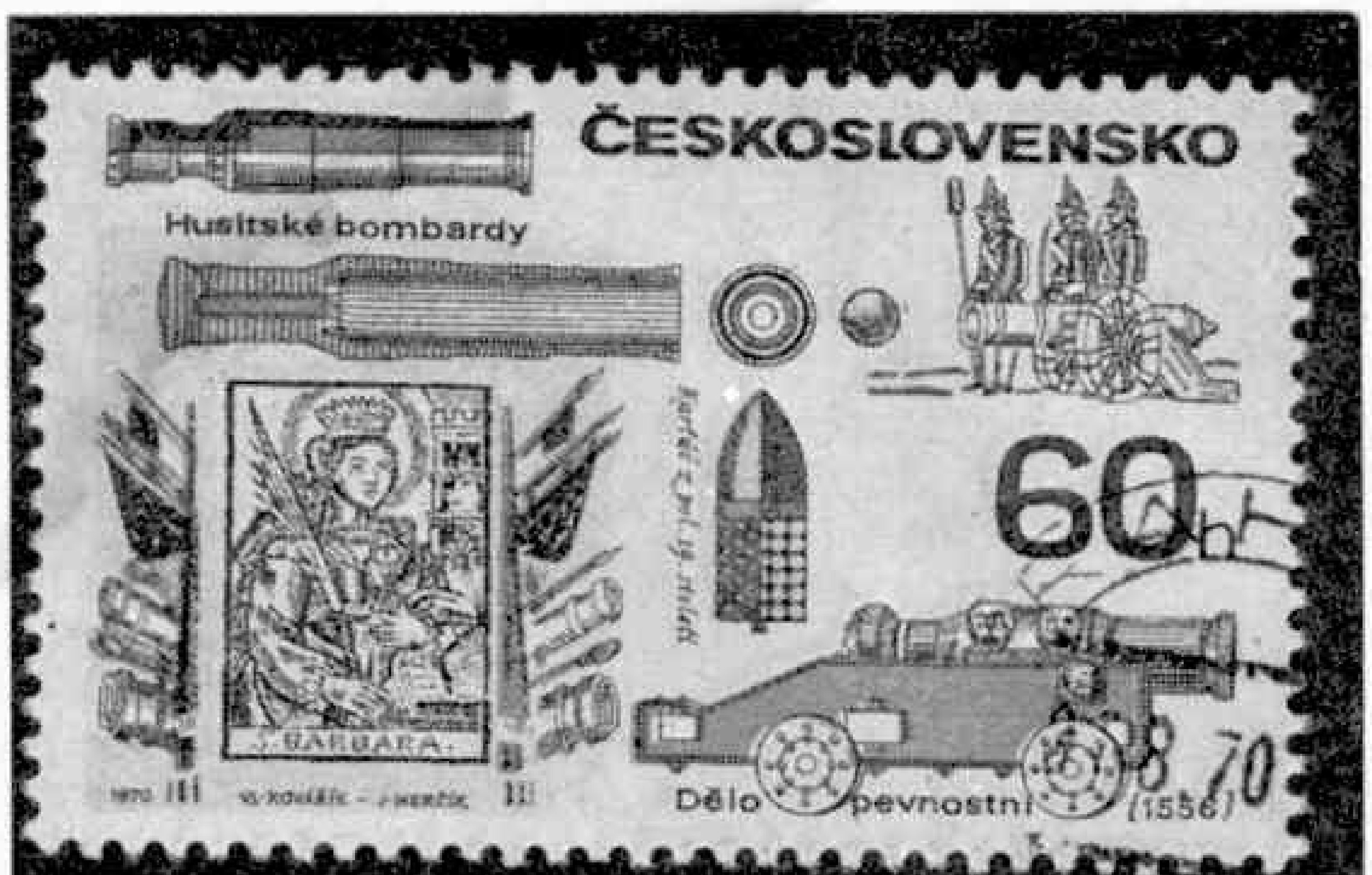
In February 1969 Czechoslovakia issued a set of stamps featuring historic handguns, chosen from interesting specimens in various museum collections. Last August a second series of five stamps was released, this time having the theme of heavy calibre weapons. The stamps have been designed in a novel manner, combining pictures of various historical weapons with a secondary motif taken from legends and literature. The stamps have been designed by Vladimir Kovarik and tastefully engraved in four or five colours.

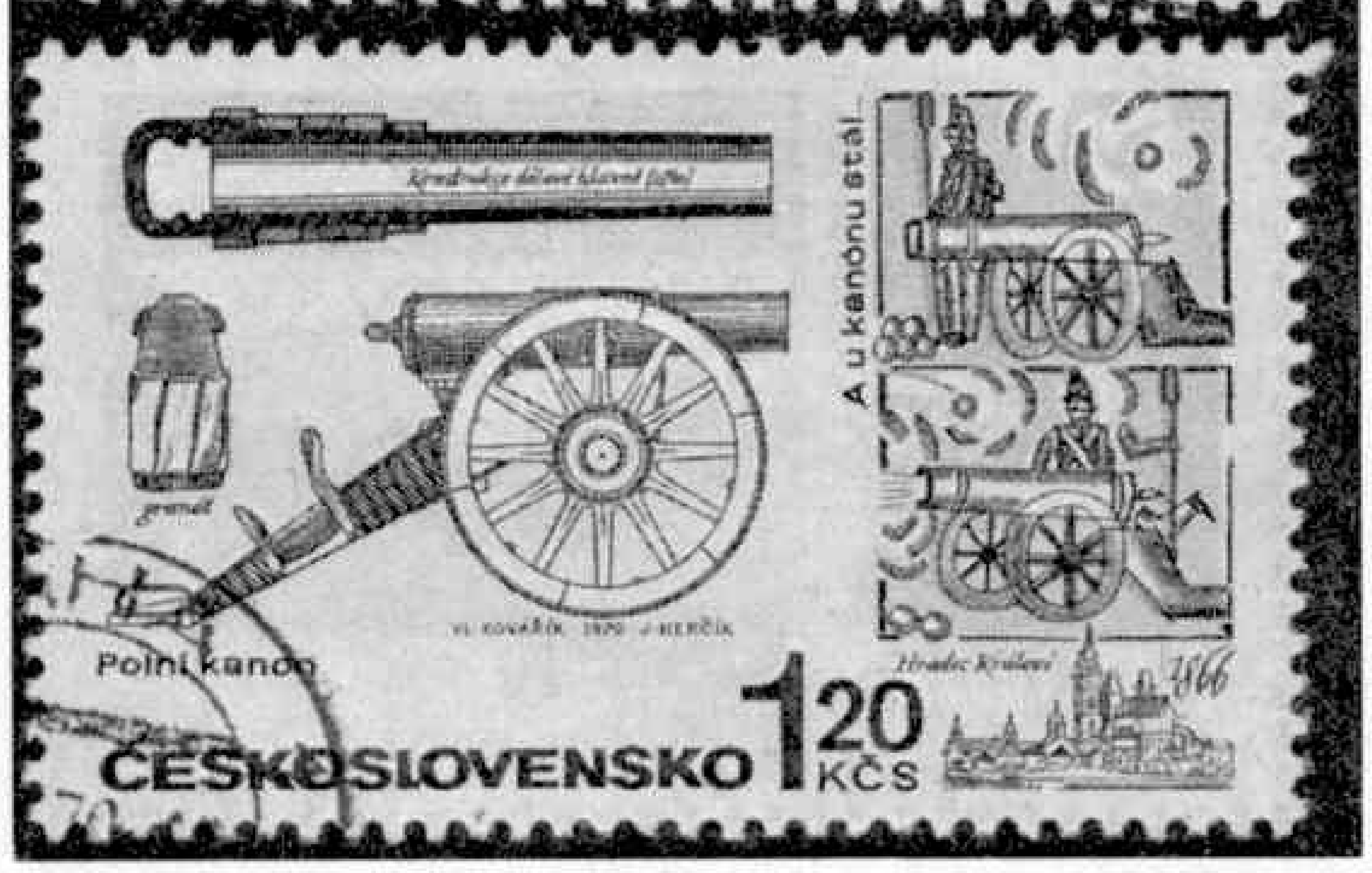
The lowest denomination, 30 hellers, depicts a cumbersome field gun from the period of the Thirty Years War (1618-48), much of which was fought over Bohemia, as the western part of Czechoslovakia is called. Also shown in the design is a section of the gun chamber and barrel. On the right of the picture is a curious figure in 18th century costume, seated on a cannon ball and gazing through a telescope. This is none other than the famous Baron Munchausen, whose tall stories have been immortalised in books and films. In this incident the Baron is said to have jumped on a cannon ball as it sped from the mouth of a cannon and flown into the sky in order to get a bird's-eye-view of the world.

The principal motif of the 60h stamp consists of the massive heavy-calibre bombards which were used during the Hussite Wars of the early 15th century in Bohemia. In the centre is shown a cartouche—the charge of shot used in the 18th century. On the left hand side is a portrait of Saint Barbara, patron saint of gunners, based on a medieval wood-carving. The 1.20 crowns denomination features a field cannon of a type used during the so-called Seven Weeks War in which Prussia destroyed the supremacy of Austria and laid the foundations of the modern German state. Most of the action in this brief war took place in Bohemia and it was at Koniggratz or Sadowa that the decisive victory was won. On the right hand side of this stamp is depicted a view of the castle of Hradec Kralove, scene of one of the battles of the war of 1866, and above this, in strip cartoon form, is depicted the legendary gunner Javurek who, faithful to his emperor Franz Josef and his military oath, stood by his cannon, continually loading and firing until his dying breath, with total disregard of the serious wounds inflicted by the gunfire of the Prussians.


ČESKOSLOVENSKO
Polní kanon z třicetileté války
1970
30h







The "teeth" of the Austro-Hungarian army were provided by the great armament works of Skoda in Bohemia, and the artillery from Bohemia saw action in Galicia, the Balkans and northern Italy in the First World War. Two weapons of this period appear on the highest denominations. The 1.80 crowns shows a giant 30.5 cm mortar constructed in 1911. By contrast the motif on the right hand side of this stamp features the colossal rocket from Jules Verne's novel *Journey to the Moon*. In the centre are shown the three heroes of this novel, Ardan, Barbicane and Nicholl, in the state of weightlessness which Verne predicted would befall space travellers.

The 2.40 crowns stamp shows a 75 mm. mountain gun, of the type used on the Italian front in 1915-18. The character depicted on the left of this stamp is the Good Soldier Schweik, the hero of Jaroslav Hasek's humorous novel. Schweik, the prototype of all the anti-heroes of modern literature, is best remembered for his cry, "Don't shoot—there are people here!"

Although many stamps have previously featured cannon which can be identified and classified this is the first time that a set of stamps has been released with this specific theme. With the growing interest throughout the world in militaria it is likely that this subject will be used as the basis of stamps from other countries also.

Almost every day we handle card-board in one form or another, T. Holloway

describes how it is made in his feature . . .

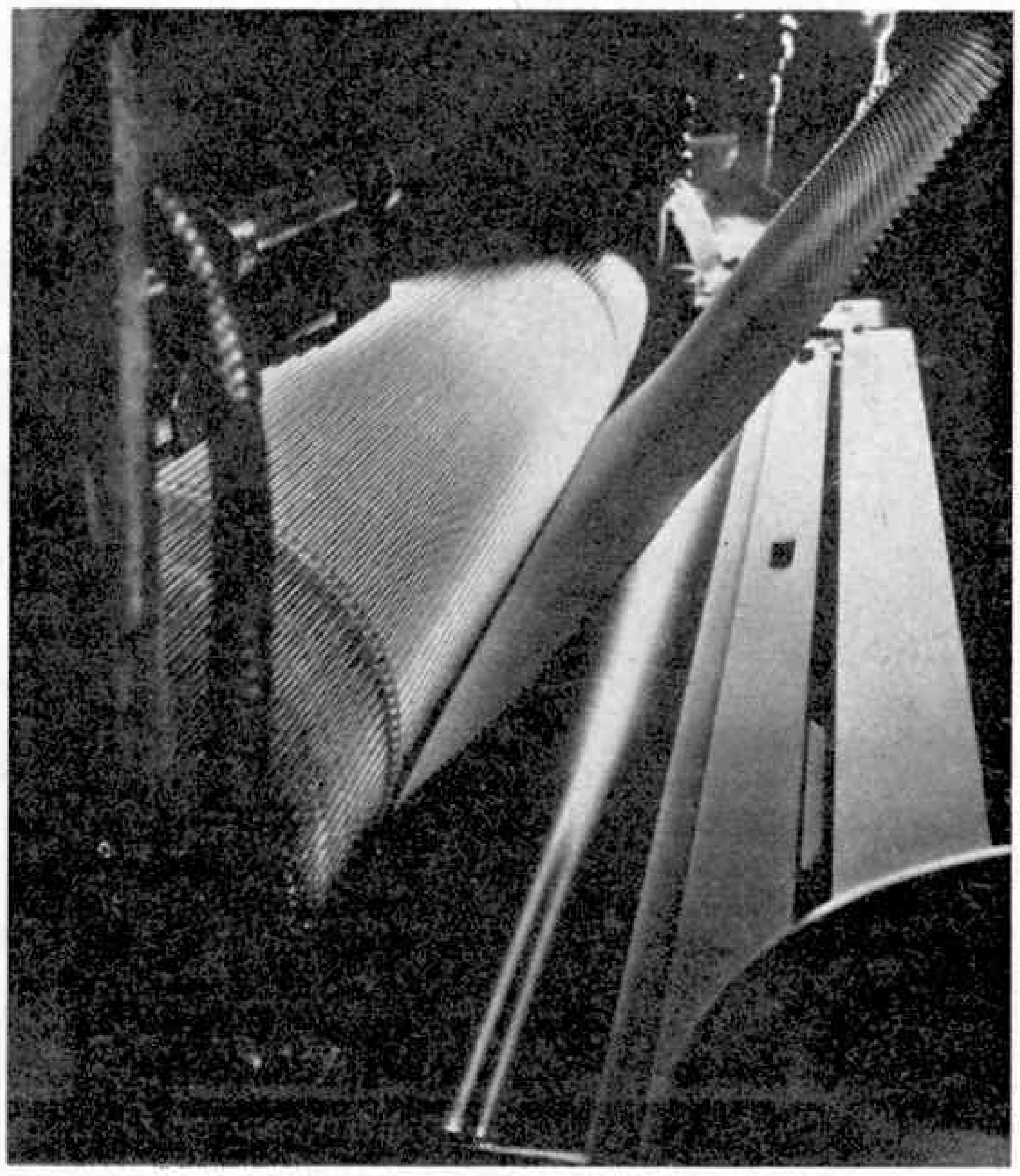
# FROM WASTEPAPER TO FIBREBOARD

TO ENABLE GOODS, whatever their type, to be handled, transported and protected, they must be packed. In the past, heavy wooden cases and chests have been traditionally used, but they are being replaced more and more by fibreboard packing cases which are cheaper, lighter and more easily handled, cutting transport costs yet providing full protection.

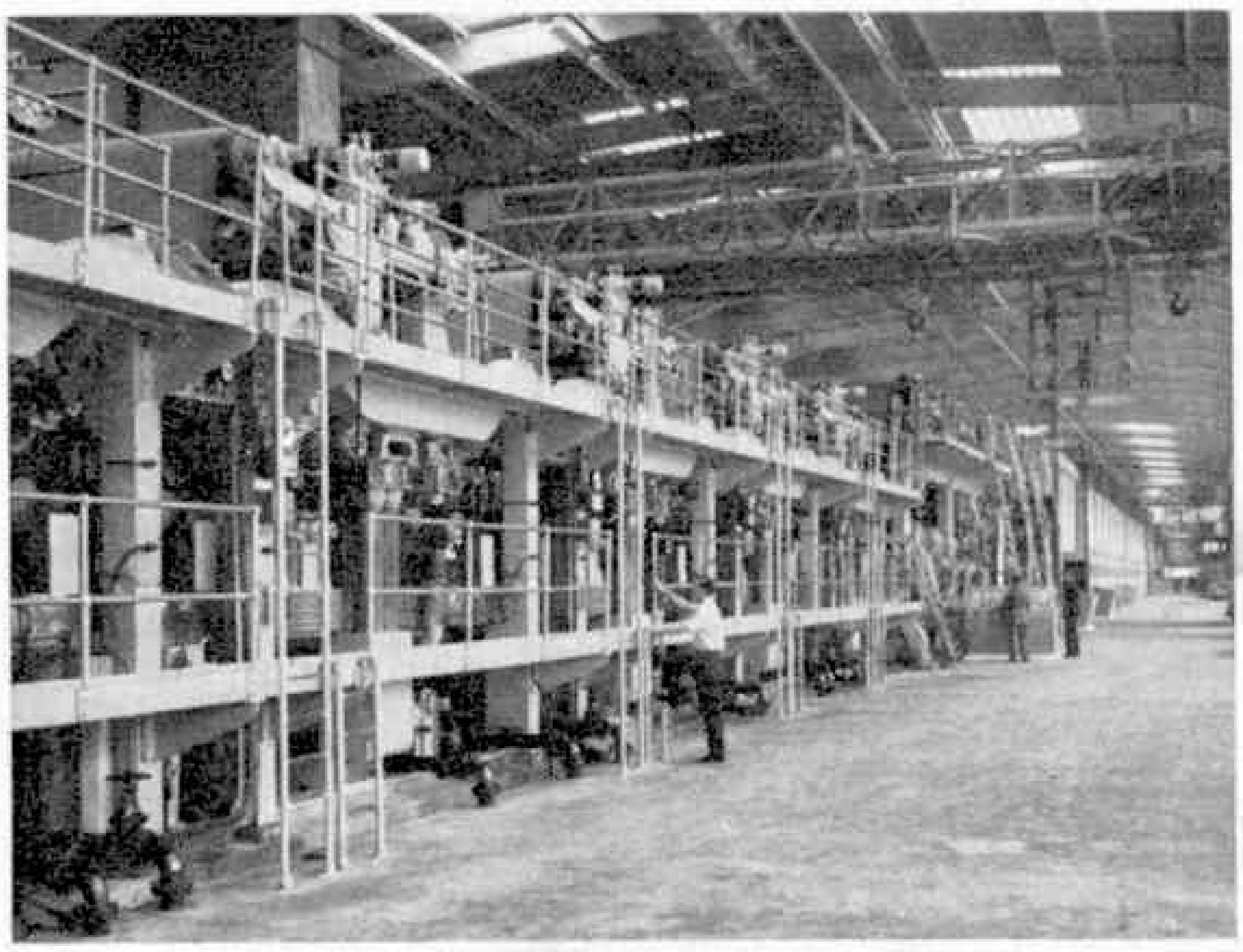
Wastepaper and woodpulp are the two main ingredients for making cardboard. Woodpulp is not only expensive, but the bulk of it has to be imported and paid for in precious foreign currency—well over £100 million every year. Imported wastepaper is also very expensive, so the more wastepaper that can be salvaged the better it is for our economy.

In 1969, the packaging board industry used 1,822,000 tons of wastepaper; 53,000 tons had to be imported at a cost of £850,000. It is estimated that the wastepaper potential in Britain is a round six million tons annually, but only 30 per cent of this is at present recovered.

The Thames Board Mills, at Purfleet, in Essex, are the largest consumers of wastepaper in Europe, using nearly half a million tons every year. The company use around 100 million gallons of water every week to clean and repulp wastepaper. Incidentally, it takes up to 10,000 gallons of water to make one ton of board.



Corrugated board is formed round steel corrugating rolls before being " sandwiched " between liners.



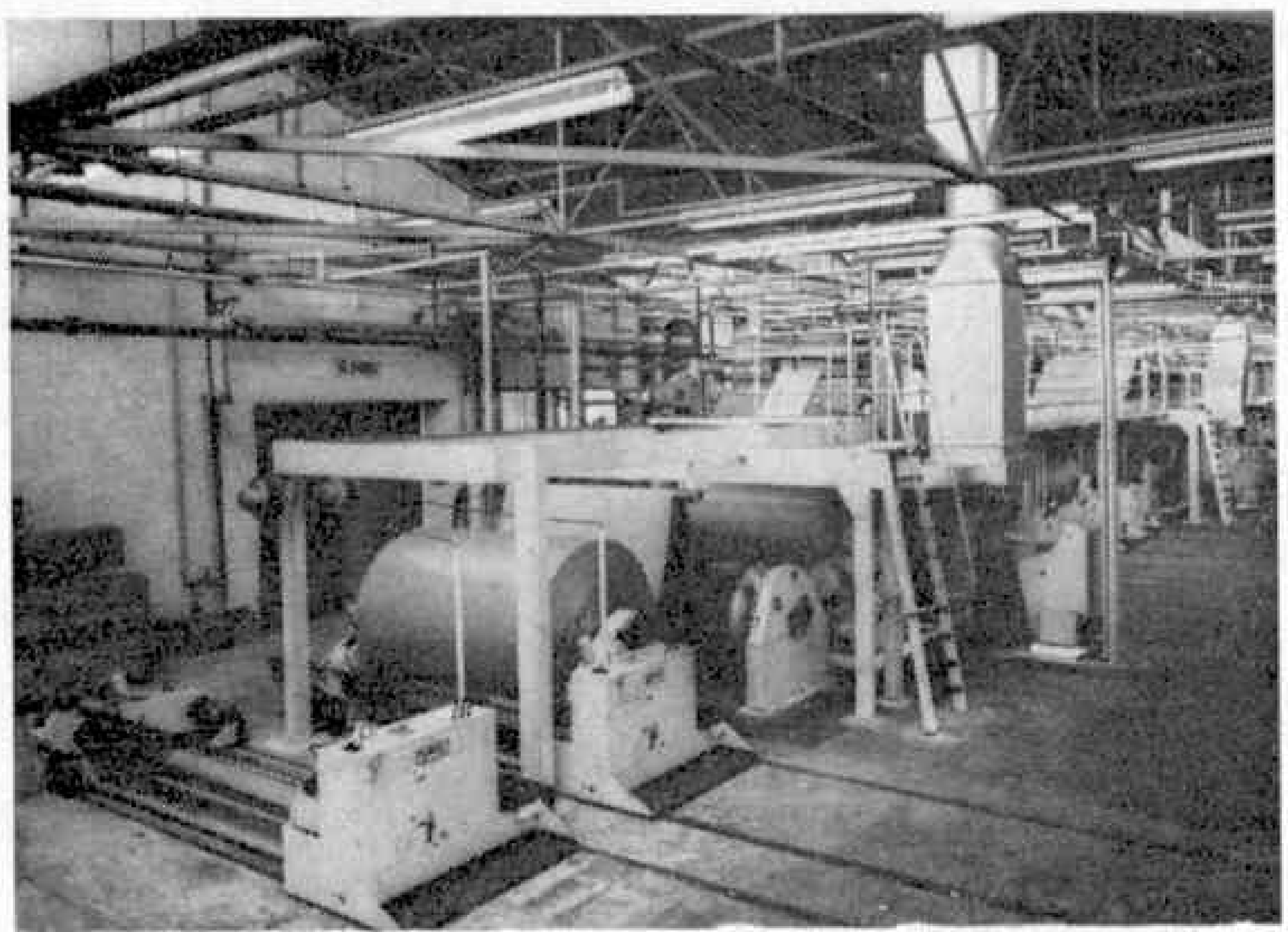
A No. 11 Inverform machine from the wet-end.

Nearly half of all packaging board produced in Britain is made by T.B.M. In one eight-hour shift, their most modern machine, known as the No. 11, can produce enough cardboard to stretch from London to Brighton. Four years' production on this machine would generate enough cardboard to reach the moon ! The machine is a 480 ft. long giant, one of the largest of its kind in the world and cost £6¼ million to build.

Wastepaper converges on the mills by road, rail and river. Mountainous tons of it, piled in wallowing barges, are towed down the Thames.

Inside the mills, the wastepaper is fed into huge circular vessels called hydrapulpers, containing hot water and each capable of handling about six tons of raw material an hour. A large diameter rotor in the bottom of the hydrapulper creates an intensive swirling action which disintegrates the paper into a pulp, or stock. Useless material, called 'contraries', are dredged out and the wastepaper stock must then be cleansed of finer dirts like sand and grit. The latest method of cleansing is by centrifugal force: the cleansed stock is thrown out of the top of the machine while dirt falls to the bottom. At this stage the stock consists of one part fibre to 99 parts of water.

At the next stage the stock is thickened by removal of water until it contains some 35 per cent fibre. The pulp is not yet fit for the board-making machine as it will still contain waxes, bitumen or other impregnating agents. The thickened stock is therefore heated under steam pressure and passed between two revolving discs in a machine known as a defibrator. Finally, the pulp is treated in refiners which reduce the fibres to the correct length for the machine.



A high-speed 87 in. Langston Masson Corrugator in the Thames Case plant at Cumbernauld, near Glasgow.

After a final screening, the fibre suspension flows to the vats of the cylinder board machines. Each machine has up to nine vats, in each of which a cylinder mould revolves. The moulds are covered wth a fine wire mesh which extracts the fibre and transfers it to the underside of an endless woollen felt. As the felt moves over the moulds it collects a thin film of fibre from each. In this way the web of board is built up to the required thickness.

Before leaving the felt, the web of board is pressed and some of the water removed. The board, still damp, next travels over steam-heated drying cylinders to remove the remaining moisture.

At the end of the board machine, huge steel calender rolls impart a smooth surface finish, the sheet is adjusted to the correct thickness and moisture content, and the web is wound onto reels. Subsequently it is slit into smaller reels or cut into sheets.

Unloading pulp and wastepaper at Thames Board Mills' Purfleet Jetty.

The latest type of board-making machine using wastepaper is the British-built " Inverform " machine, the 'No. 11' referred to earlier. It differs from the normal cylinder board machine in that it has an endless wire belt on to which the fibre is deposited from above. Actually, the machine deposits not one but up to five layers of fibre at five different stations along the wire belt.

At each of the five stages a top wire belt presses on the web from above, consolidating the layers and squeezing out the water. The water is drained upwards by suction as well as downwards. This is a new technique which permits much faster drainage rates with a consequent increase in machine speed. With an output of 80,000 tons a year, the No. 11 machine can run at speeds up to 1,500 ft. of board a minute, compared with a maximum running speed of about 600 ft. on a cylinder board machine.

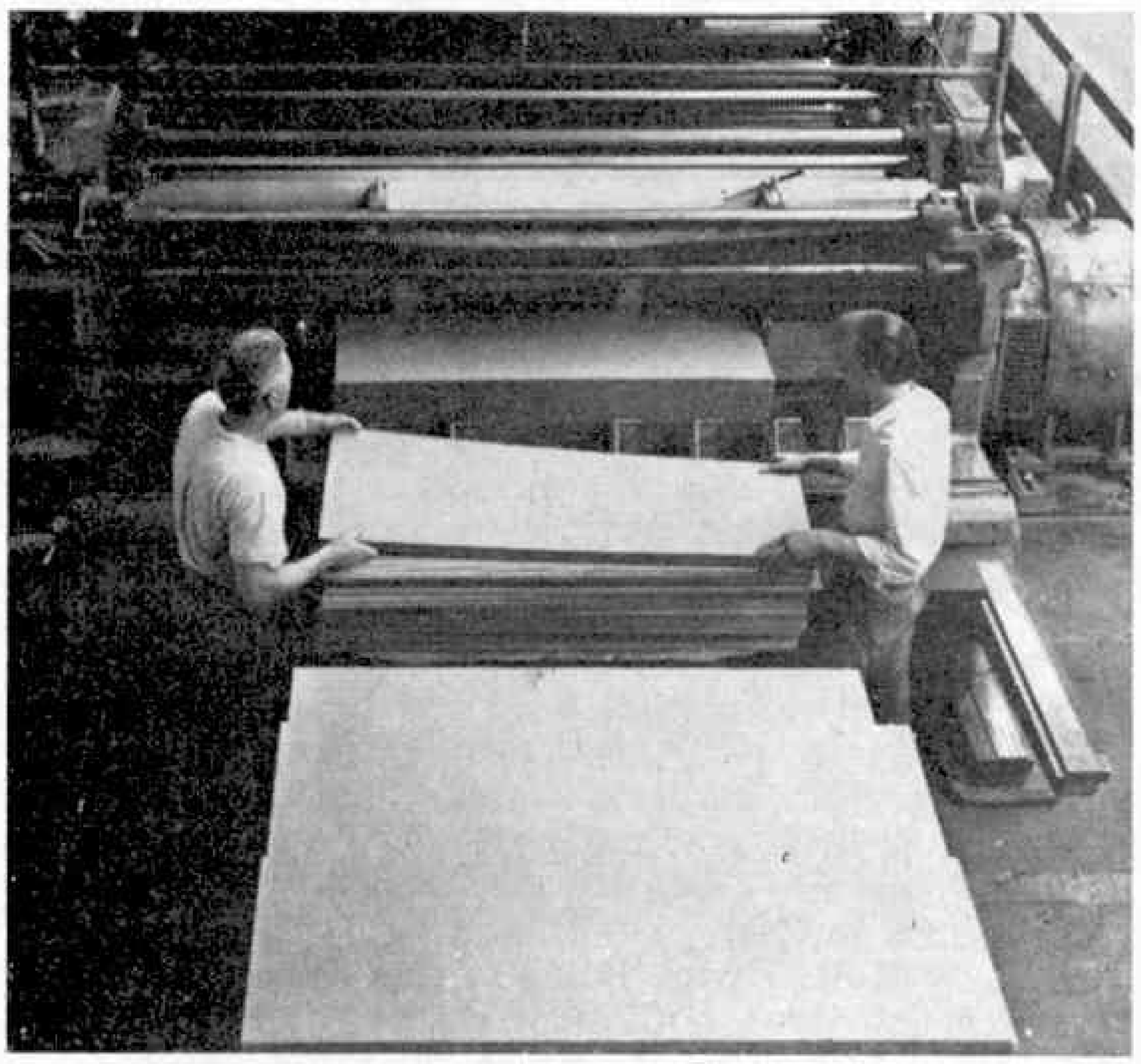
At its Workington Mill, T.B.M. have another " Inverform " type machine, the 'No. 12', which uses home-grown timber to make board.

## Fibreboard Cases

Actually, Thames Board Mills does not itself undertake the production of fibreboard cases. This is carried out by an associated company. Thames Case Limited, whose production includes corrugated and solid fibreboard transit cases.

The raw material for a fibreboard packing case is, of course, board. Layers of board, or ' paperboard ', are pasted together to make the stronger, more rigid material known as fibreboard.

There are two main types: corrugated and solid. Corrugated fibreboard consists of a ' fibreboard sandwich ' with wavy, corrugated ' fluting ' contained between flat ' liners '. This construction enables the material to stay rigid and, at the same time, cushions goods and absorbs the knocks and jostling of travel. Solid fibreboard, on the other hand, is a tough, dense material, made up of several layers of board pasted together. Cases made from this material are very strong and moisture-resisting. They are particularly suitable for packing engineering goods and heavy industrial equipment and are often preferred for the transit of export products.



Blanks loaded onto a printer-slotter machine.

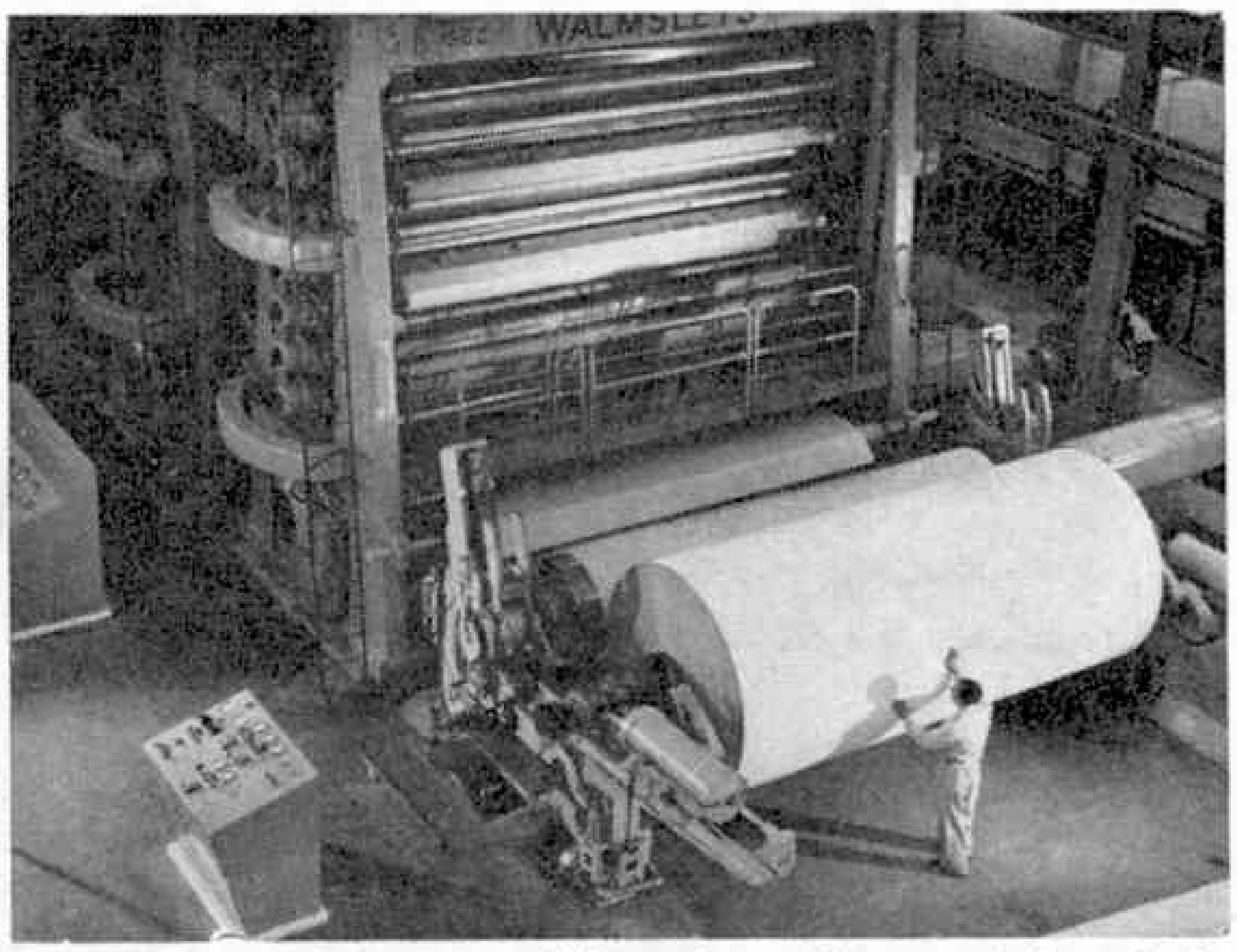
The first step in the production of a fibreboard packing case is to apply adhesive to board fed from large cylindrical reels, and to laminate a number of layers into one continuous sheet of fibreboard.

For solid fibreboard, this gluing operation is performed on a machine called a paster, while corrugated fibreboard is made on a corrugator, where fluting material is formed round steel corrugating rolls before being sandwiched between liners. Each of these two types of machine is capable of producing over 10,000 square metres of fibreboard an hour.

At the end of the pasting or corrugating machines the unbroken fibreboard is cut into rectangles of board, known as ' blanks '. These blanks are then processed to become finished cases.

First they are creased, then printed and slotted to form flaps for the finished case. Next, the sides of the blank are brought together by folding and a join is formed either by stitching, gluing or taping (wire ' stitches ' are used, or strong adhesive paper tape).

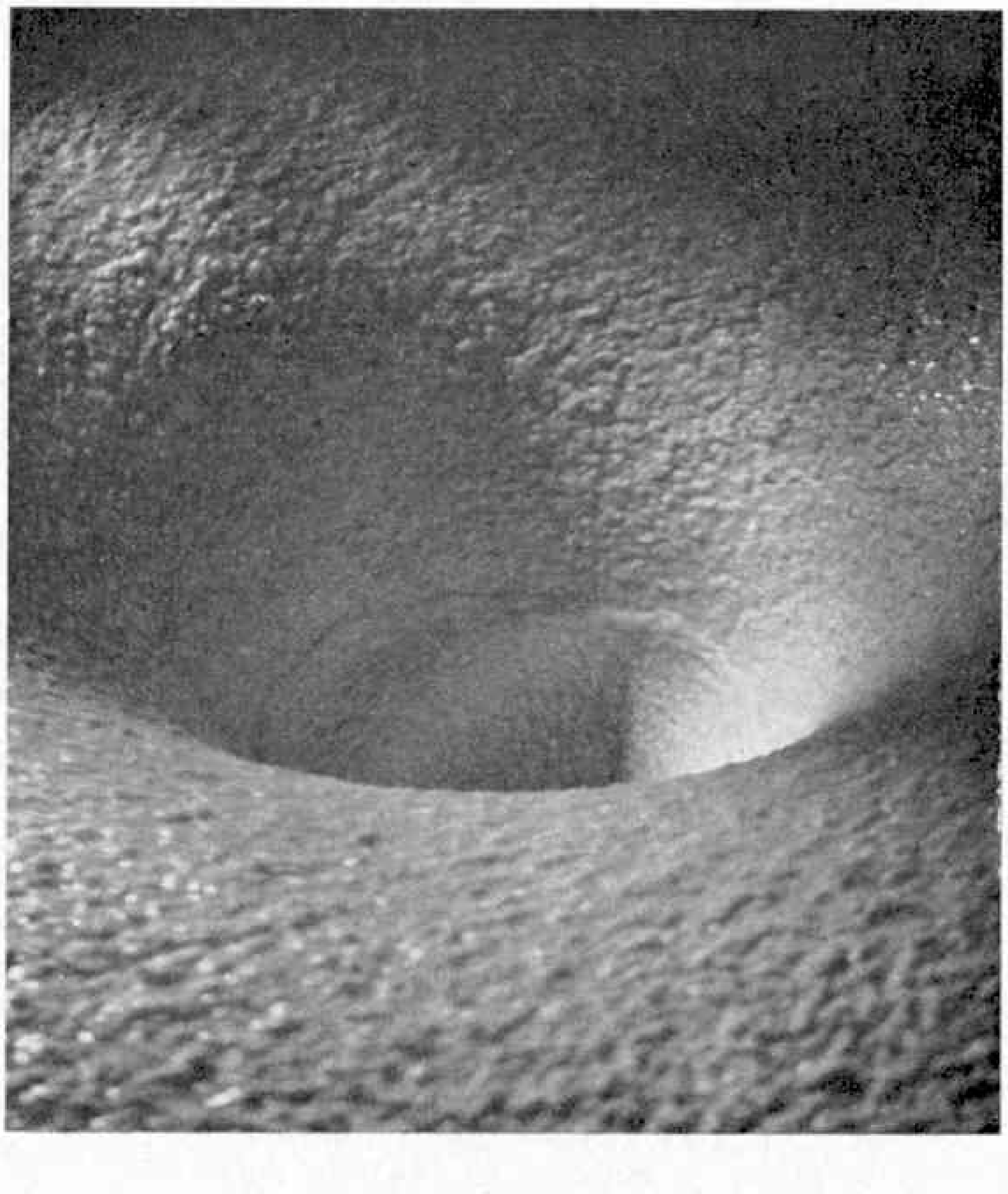
This conversion from blank to finished case can be carried out at a rate of 6,000 an hour on two separate machines or, alternatively, at double that speed on a single highly sophisticated flexographic case-maker.



Finished board being wound in reels at the completion of the production process.

When the case-making process is complete, cases are collected together, bound into bundles and loaded onto lorries. The tops and bottoms of the cases are not yet sealed at this stage, so they are still flat and easy to handle.

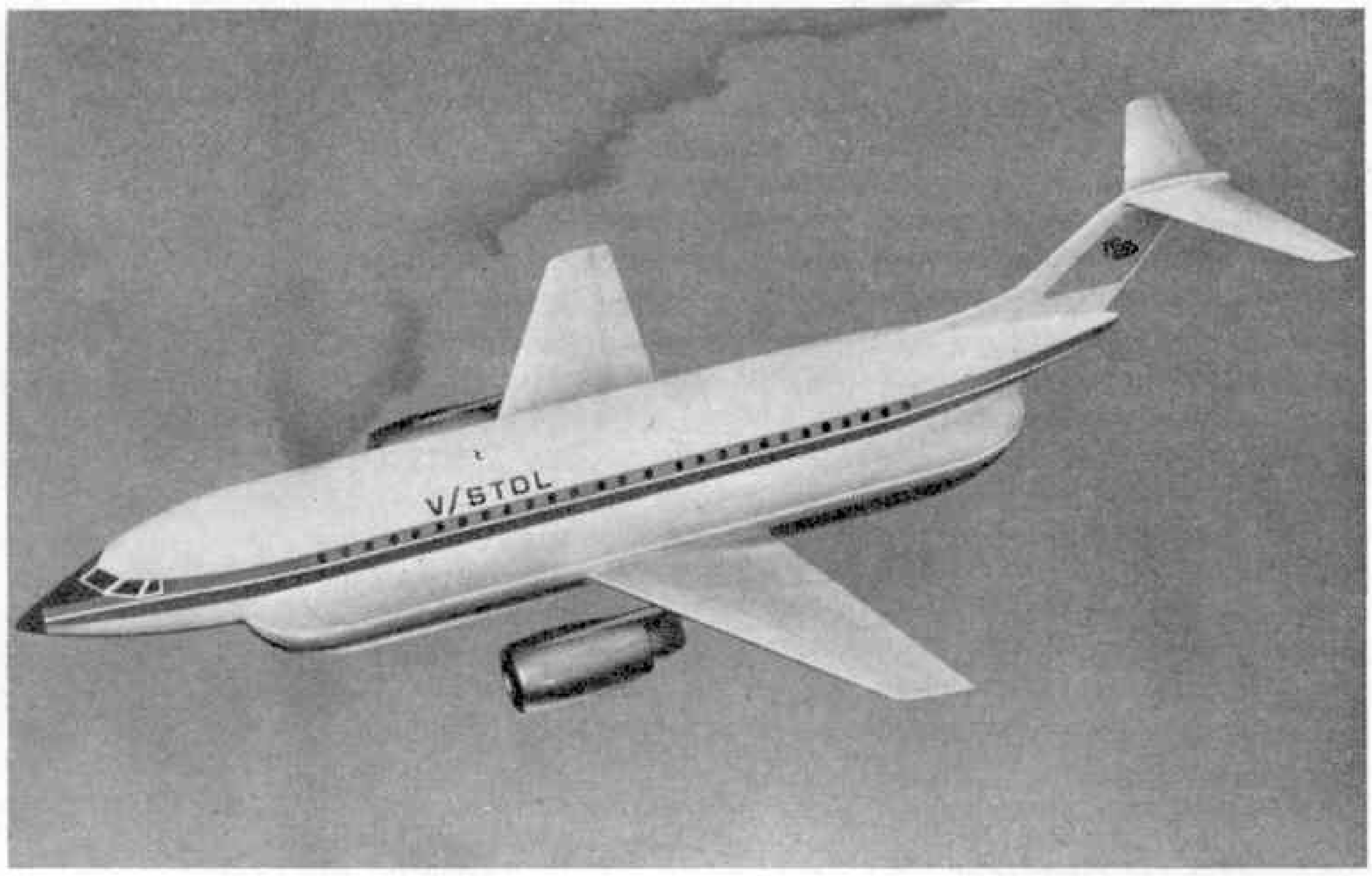
Cases are often mistakingly referred to as ' cartons '. In the terms of the trade they are two different things. A carton is the printed cardboard box you see in shops and supermarkets containing anything from detergents to cornflakes. A case is a medium for transporting bulk consignments of cartons safely from manufacturer to retailer. A well-made case is tailor-made for the particular product it has to carry and undergoes rigorous actual-use testing before going into full-scale production.



Woodpulp reduced to a fine stock in a hydropulper.

# TRANSPORT TOPICS

## by Mike Rickett



An artists impression of the new Hawker Siddeley HS 141 V/STOL Airliner.

ALTHOUGH THE APOLLO 13 REVIEW BOARD is shortly to present its findings and recommendations on the various disasters of that particular mission, the landing site for the Apollo 14 mission has already been selected by the National Aeronautics and Space Administration. Apollo 14 is not now expected to be launched until January 1971, when modifications to the oxygen tanks in the Service Module are expected to be complete. Readers may recall that these tanks were the cause of an explosion during the ill-fated Apollo 13 mission, leading to an abandonment of the original objectives and the most hazardous journey home ever to take place in space.

Apollo 14 is to have Alan B. Shepard USN as its Commander, Stuart A. Roosa USAF as the Command Module Pilot, and Edgar D. Mitchell USN as the Lunar Module Pilot. The landing site on the Moon selected is in the hilly uplands north of the crater Fra Mauro, about 110 miles east of where Apollo 12 landed last November. Fra Mauro is of particular interest to scientists because it is expected to provide much new information on the age of the Moon.

### Space Shuttle Development

Looking much farther ahead than the next Apollo launchings, plans are being finalised for a two-stage, fully re-usable Space Shuttle which would be used as a supply vehicle for future manned Earth orbital operations, including a 12-man space station which is also being studied by the Americans. The Shuttle will probably be a vertical take-off, horizontal landing space ship and could be in operation in 1977 or 1978.

In operations, the Space Shuttle's first stage would boost the orbiting second stage into space and then fly back to Earth and land on an airstrip. Once its job in orbit round the Earth was complete, the second stage would then return. Both parts of the shuttle would be refurbished for repeated flights. It will be able to transport crew, passengers and cargo from Earth to near space and back. It could also be used for delivering fuel and supplies to a space station, retrieving modules and satellites and for special purpose flight missions including rescue operations.

The engine that NASA intend using for the Space Shuttle is a high pressure bell engine that can be reused as many as one hundred times. A cluster of these engines will be used in the booster stage and a lesser number—probably two or three—in the second stage.

### New Hawker Siddeley HS 141

Also looking to the future is the new fan lift vertical/short take off and land airliner being developed by Hawker Siddeley for the 1980's. The HS 141 will carry 100-120 passengers at a cruising speed of over 600 m.p.h. Because it is of the vertical take-off and landing type, the aircraft will be able to operate from small restricted sites or from existing heliports or peripheral airfields. It will also have a range of 500 miles, which of course means it will be able to operate over most of the high density routes in Europe from the Baltic to the Mediterranean.

In cruise it is powered by Rolls Royce fan jet propulsion engines designed specifically to reduce noise level. The vertical take-off and land capability is provided by Rolls Royce RB 202 fan lift units mounted in sponsons along both sides of the fuselage. The HS 141 uses fail safe principles at every stage of the design, and the fan lift system with its multiple self-contained lift engines has enough thrust to guarantee safety even if two engines fail.

### Phobos—Mars's second moon

A photograph taken 86,000 miles from the planet Mars by Mariner 7 in 1969 shows one of the two Martian moons to be both very dark and also lob-sided or potato shaped. This was disclosed in May by a New Mexican State University astronomer and Mariner project scientist.

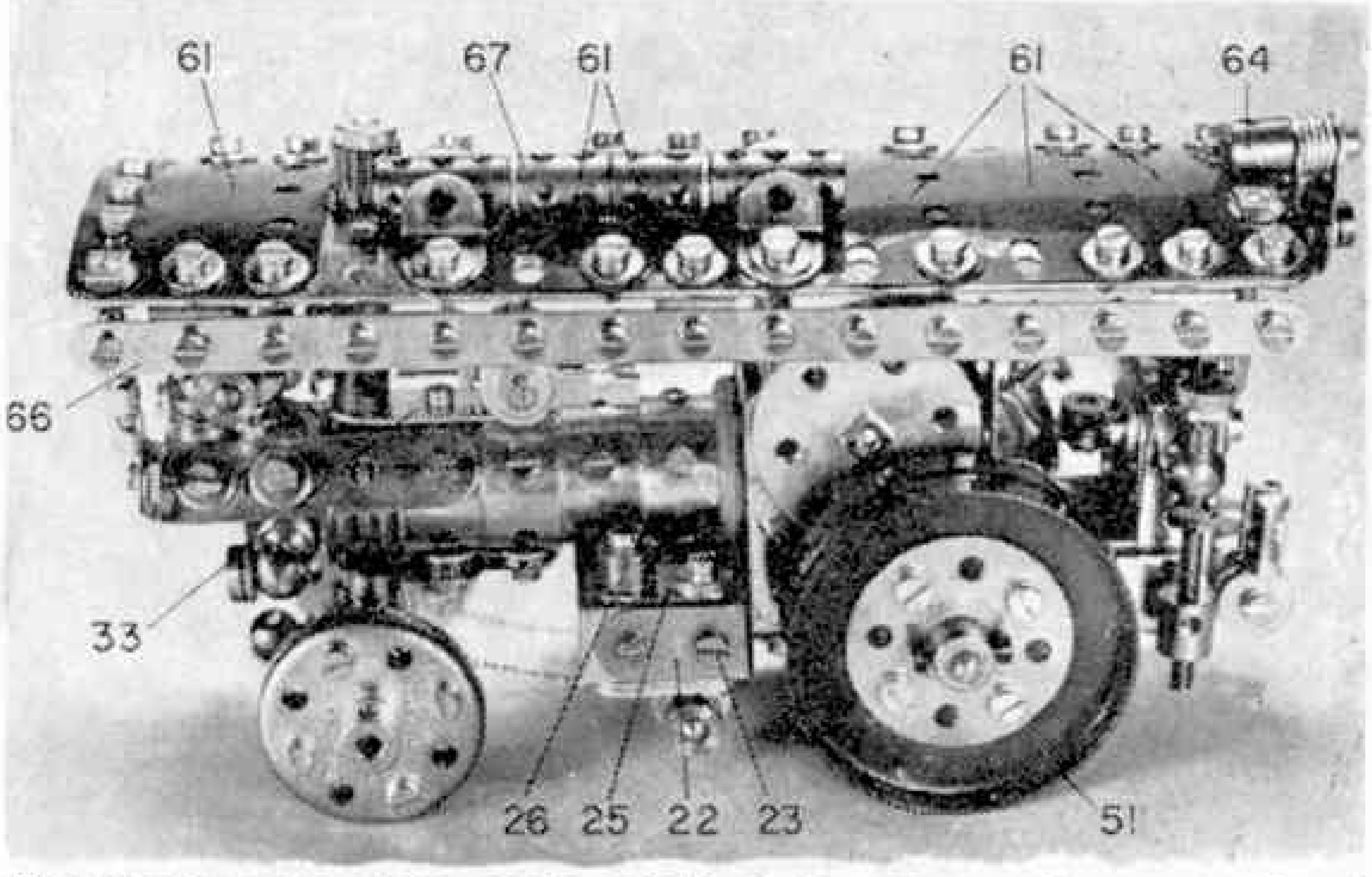
Phobos, the larger of the two Martian moons, measures only about eleven miles from pole to pole, and fourteen miles in diameter at its equator—hence its potato shape! Phobos is however larger than Deimos, the other moon, which is thought to be only five or six miles in diameter. According to studies made after the photo was taken by Mariner 7, Phobos appears to be the darkest body yet seen in the Solar System, and this is believed to be due to a relatively dust-free surface.

The fact that Phobos is elongated seems to suggest that the moon was captured by the Martian gravitational pull millions of years ago. The planet orbits round Mars at about 4,000 miles.

# MEET THE CUP WINNER

## *described by 'Spanner'*

## *PART II*



**Considering its size—only eight inches long—the amount of detail built into the Traction Engine is amazing, as this general view of the finished model suggests.**

### Belly Tank

Fitted to the front of the body, beneath where the boiler will later be positioned, is a feature known as a "belly tank". This is built up from a 2½ × 1 in. Double Angle Strip 21, to each lug of which a 1 × 1 in. Angle Bracket 22 is bolted, the forward securing Bolt fixing an Angle Bracket through its circular hole to the inside of each lug. The rear securing Bolt, numbered 23 in the accompanying illustration, is actually a Set Screw and is screwed, not into a Nut, but into the transverse bore of a Threaded Boss. Bolted to the free lug of Angle Bracket 22 at each side is an Obtuse Angle Bracket 24 and a Fishplate 25, but note that the securing Bolt in the case of the left-hand assembly is a ½ in. Bolt which is also fitted with a Collar 26. An ordinary Bolt with a Washer is used in the right-hand assembly. A second Obtuse Angle Bracket is fixed to the free end of the Fishplate, the securing Bolt being screwed into the longitudinal bore of the above Threaded Boss.

The base of the tank is supplied by three 2½ in. Flat Girders 27, one on top of the other, with similar-shaped holes coinciding. Bolted to the top of these Girders, through the centre circular holes, is a ½ × ½ in. Reversed Angle Bracket, free lug pointing outwards, the securing Bolt passing through the lug with the circular hole. Two Angle Brackets are then bolted to the underside of the Girders in the positions shown, each Bracket being spaced from the Girder by a Washer on the shank of the securing Bolt which, insidentally, passes through the elongated holes both of the Bracket and the Girder. The Brackets are adjusted forward in the Girder's elongated holes. A 2½ in. Rod is journalled in the circular holes in the Angle Brackets, where it is held in place by a Collar and a Driving Pinion from a No. 1 Clockwork Motor 28. The whole assembly is then screwed to the above-mentioned Threaded Bosses, as well as being fixed to Fishplates 3 by a ⅜ in. Bolt, shank pointing downwards, with two Washers fitted beneath its head.

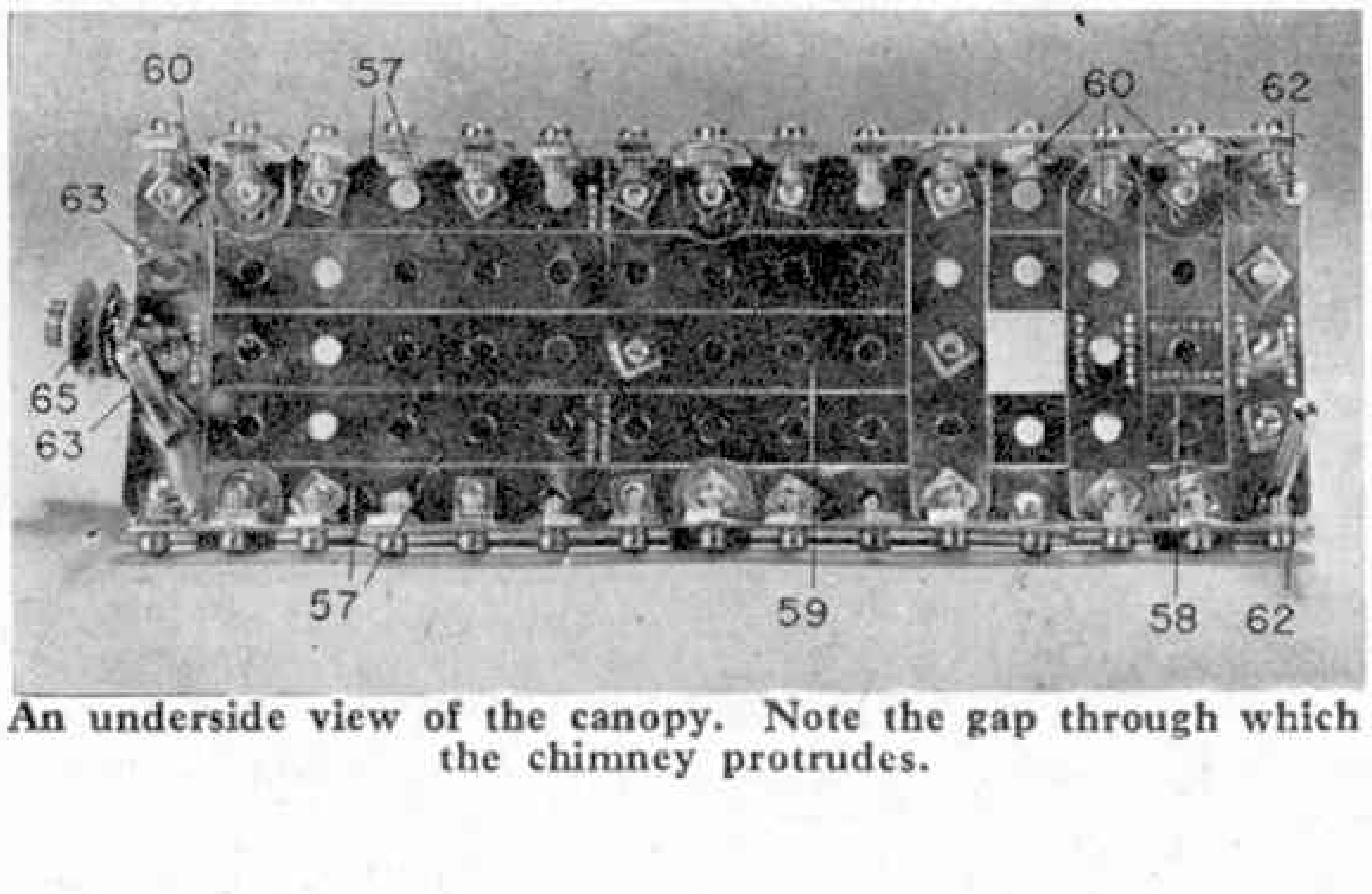
### Boiler

Coming to the boiler, two 3½ in. Strips 29 are formed into a complete circle, the ends overlapping one hole, two 2½ in. Strips 30 being bent to follow the same radius. Using Set Screws 31, all these Strips are fixed to two 2 in. Slotted Strips, bent longitudinally to follow the curve of the Strips, the forward end securing Set Screws also fixing two further 2 in. Slotted Strips 32 in position. A ¾ in. Bolt, shank upwards, is then inserted through the centre hole in the rearmost Strip 29, is fitted with a Crank 33 and a Washer, after which it is secured by a Nut. Fixed by Nuts on the protruding shank of the Bolt are a Double Bracket 34 and an Angle Bracket, the latter with a ½ in. Bolt secured in its free lug, as shown. Two Rod and Strip Connectors 35 are bolted, one to each lug of the Double Bracket. Crank 33 is further bolted to foremost Strip 29 through the centre hole in the arm of the Crank.

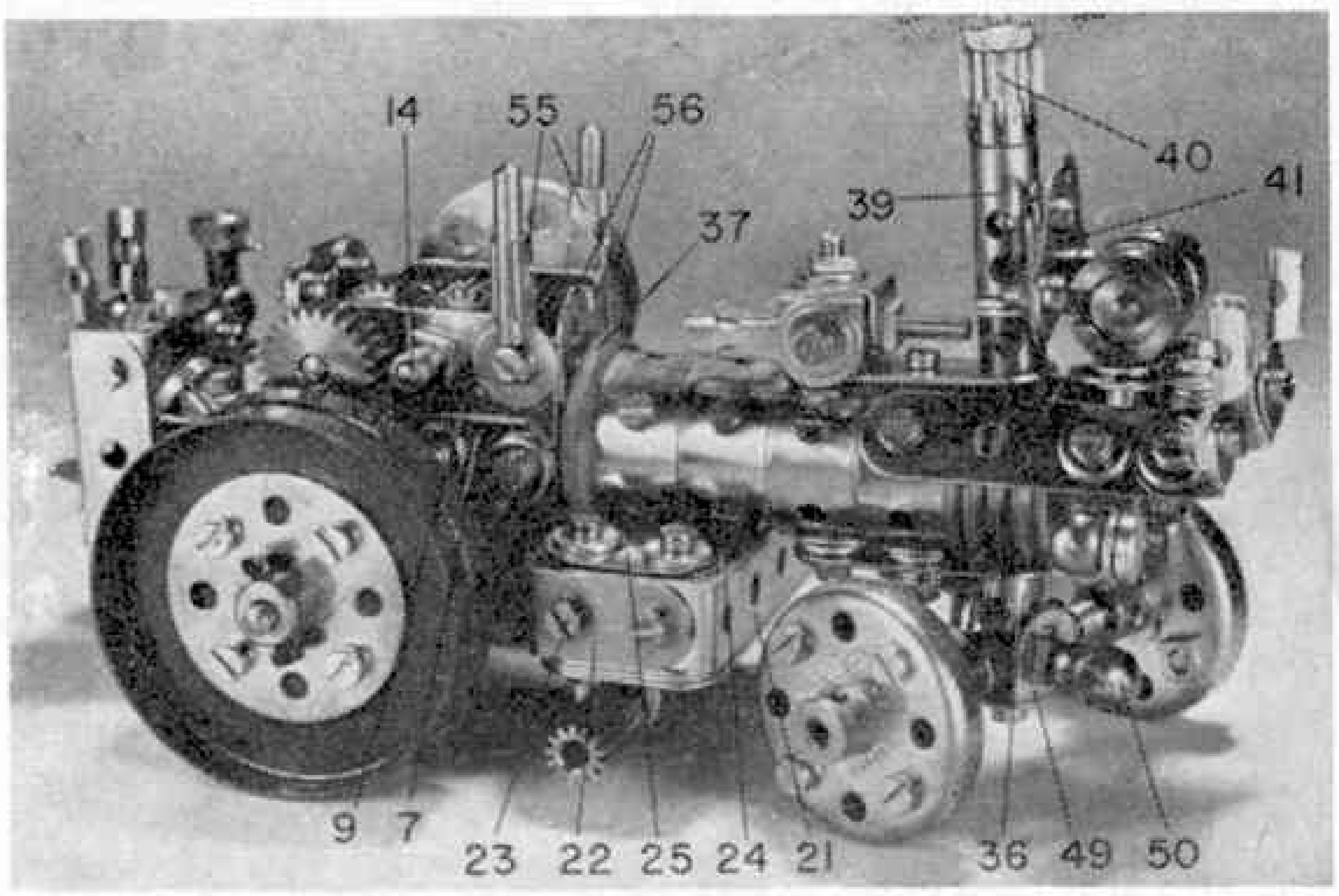
Attached to the underside of the boiler, but spaced from it by a Washer on the shank of the securing ⅜ in. Bolt, is a Threaded Crank 36, the Bolt also passing through the holes in the overlapped ends of forward Strip 29. An Angle Bracket, later acting as the steering check-stop, is held by the same Bolt, this Bracket being spaced from the arm of the Threaded Crank by another Washer. The end of the Threaded Crank is now bolted to rear Strip 29, being spaced from it by a Washer, the securing Bolt also fixing the boiler to the free lug of the ½ in. Reversed Angle Bracket included in the belly tank. Note that the lug fits behind the overlapped ends of the Strip, inside the boiler.

It will be noticed at this stage that a gap remains between rear Strip 30 and the front of the tender. Inserted into this gap is a 1 in. loose Pulley fitted with a Rubber Ring 37, after which a 3½ in. Rod is mounted in the centre hole of the Pulley and secured in the Threaded Coupling carried inside the tender. Mounted on the front end of the Rod are three further 1 in. loose Pulleys 38, all clamped tightly against forward Strip 29 by a 1 in. fixed Pulley. The Boss of this last Pulley is fitted with a Set Screw to represent the smokebox door handle.

In building the Chimney, a 1 in. Rod is fixed in the boss of Crank 33, the Rod then being fitted with two Washers and a Threaded Coupling 39. Screwed into the longitudinal tapped bore of this Coupling is a 1 in. Screwed Rod, on which a $\frac{7}{16}$ in. Pinion 40 is held by an electrical Terminal Nut. Secured to the



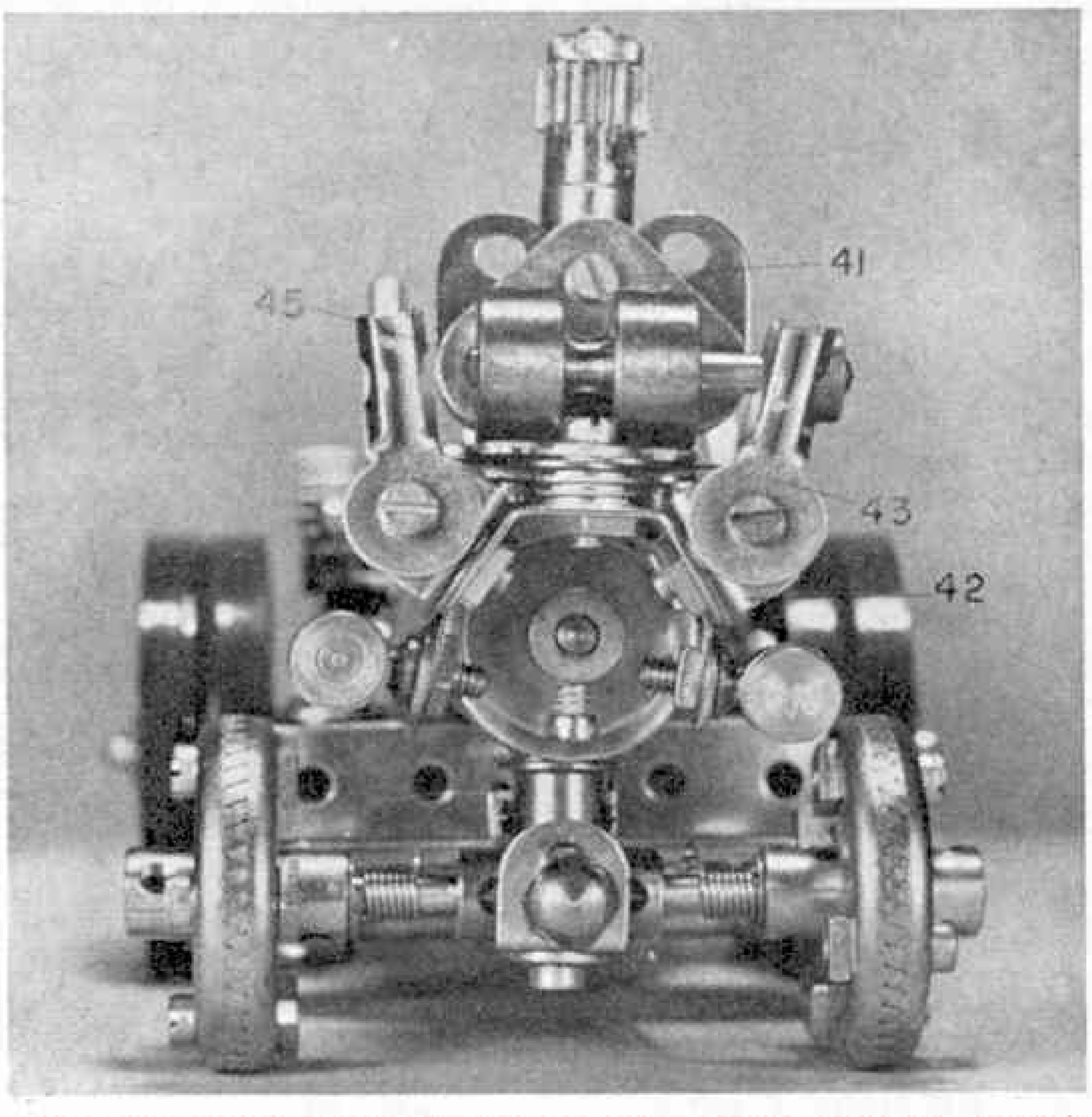
**An underside view of the canopy. Note the gap through which the chimney protrudes.**



**The strong and sturdy construction of the body, boiler and belly tank is clearly shown in this illustration.**

forward face of the Threaded Coupling through one centre transverse tapped bore, but spaced from the Coupling by a Washer, is a 1 in. Corner Bracket 41, the fixing Set Screw passing through the apex hole of the Bracket. Two upward-pointing Fishplates are bolted one to each base corner of the Bracket, the whole arrangement representing a heat shield.

Fixed between the forward ends of Slotted Strips 32, in front of the heat shield, is a Double Bracket, the lugs of which are opened out to correspond with the slope of the Strips. The securing Bolts each fix an Angle Bracket 42 to its respective Slotted Strip, a Rod and Strip Connector 43 being bolted, in turn, to the free lug of this Angle Bracket. Secured to the centre of the Double Bracket, but spaced from it by three Washers on the shank of the fixing ⅜ in. Bolt, are two Fishplates, angled apart, a Socket Coupling 45 being fixed by Set Screws to the Free ends of these Fishplates. Two Washers are mounted on each securing Set Screw, one each side of the Fishplate to ensure that the shank of the Screw does not foul the large internal bore of the Socket Coupling. Carried in the large bores of the Coupling are two Collars, fixed on a 1½ in. Rod arranged with one end projecting out of the Coupling. A Collar is mounted on the end of the Rod, the finished unit then providing a good imitation generator.



**A close-up front view of the model—minus canopy—showing the smokebox and generator.**

Two Obtuse Angle Brackets are bolted, one to each Slotted Strip 32, positioned in the rear end of the slot. Fixed to the free lug of each of these Angle Brackets, but spaced from it by a Washer, is a Handrail Support 46, in the head of which an electrical Contact Stud is secured to represent a headlamp. A Washer is carried on the shank of the Contact Stud.

### Wheel assemblies

Coming to the wheel assemblies and dealing first with the front wheels, a Long Threaded Pin, head outwards, is fitted with, in order, a 1½ in. Contrate Wheel, an electrical Thin Washer and a Cord Anchoring Spring 46, the last holding the Contrate against the nut of the Threaded Pin, but with sufficient freeway to allow the Contrate to spin freely on the Pin. A second Contrate Wheel 47 is bolted to the first Contrate, the teeth of the two intermeshing, then the Threaded Pin is fixed by 7/64 in. Grub Screws partway in the longitudinal bore of a Coupling 48, care being taken to ensure that the Pin does not obstruct the centre transverse bore of the Coupling.

Another Threaded Pin construction is built up and fixed in the other end of the Coupling, after which the Coupling is mounted, along with a Washer and an Angle Bracket 49, on a ¾ in. Bolt screwed into the boss of Threaded Crank 36 where it is held by Grub Screws. A Handrail Support 50 is then fitted with a Nut; is inserted through the elongated hole in the free lug of Angle Bracket 49; fitted with a Washer, and finally screwed into the centre tapped bore of Coupling 48. The complete axle can now be coupled to the 2½ in. Rod carrying Pinion 28 and, to achieve this on the original, Mr. Halliday used a short length of small locket chain (obtainable from Woolworths) in the interests of realism. However, Meccano Cord would function perfectly well in its place. The chain or Cord is wound several times round the Rod and the ends attached to the eyes of Cord Anchoring Springs 46 on the front axle.

In the case of the rear axle 8, the assembly of this has already been described during the construction of the tender. The two rear wheels, however, are each supplied by two Wheel Flanges 51, bolted face to face, at the same time fixing a Bush Wheel to the outer Wheel Flange, boss pointing outwards. The right-hand wheel is mounted on the axle, being spaced from the 60-teeth Gear Wheel by five Washers, and a Collar, while the left-hand wheel is spaced from the tender side by, in order, two Washers, a ¾ in. Washer, another two Washers, a second ¾ in. Washer, seven more Washers and finally by a Collar.

Acting on the left-hand rear wheel is a brake, the shoe of which consists of a Pawl 52 bolted to the elongated-hole lug of a left-hand Corner Angle Bracket which is in turn bolted to the short lug of a 1 × ½ in. Angle Bracket 53, pivotally held by Nuts on the protruding shank of the ½ in. Bolt fixed in the second hole of left-hand Girder 2. Held by a Nut in the end hole in the long lug of Angle Bracket 53 is a Set Screw, shank pointing outwards. Screwed onto this shank is a Threaded Boss 54, in the longitudinal bore of which a 2 in. Screwed Rod is mounted, this Rod also passing through the smooth bore in the head of Handrail Support 18 where it is loosely held by two locked Nuts beneath the Support and by a Cord

Anchoring Spring and a Nut above the Support. An electrical Terminal Nut is fixed on the top end of the Screwed Rod to serve as a handwheel.

## Canopy

This brings us to the canopy, but before dealing with it, it is advisable to fit the two centre canopy stays which are, in fact, only imitations, not actually being connected to the canopy. The flywheel must first be removed to allow access to the left-hand stay. Each stay consists of a Rod and Strip Connector 55 bolted to the top forward hole of Flat Girder 9, the securing Bolt also fixing an Angle Bracket to the inside of the Girder. Attached to the free lug of this Angle Bracket, but spaced from it by a Washer, is a second Angle Bracket 56, the free lug of which projects upwards as shown. Note that the two Angle Brackets should be bolted together before being fixed to the Flat Girder. A 1 in. Rod is fixed in each Rod and Strip Connector.

Construction of the canopy, proper, should present no problems. Four 7½ in. Strips 57, a 1½ in. Strip 58 and a 5½ in. Strip 59 are connected together at the ends and through their third and fifth holes by four slightly curved 2½ in. Strips 60, at the same time fixing six 2½ × 1½ in. Plastic Plates 61 in position. Note that the Strips and Plates are situated so as to leave a space towards the front centre of the canopy, through which the chimney will project. Note also that front corner fixing is achieved, not by Bolts, but by Long Threaded Pins 62, the Plastic Plates being protected by electrical Thin Washers. Long Threaded Pins 63, fitted with Thin Washers, are also used to fix the rear ends of inside Strips 57 to Strips 60. The rear end of Strip 59, on the other hand is secured by a Bolt screwed into one transverse bore of a Threaded Boss 64, in the longitudinal bore of which a ½ in. Bolt, carrying two Fishplates separated by five Washers, is fixed. Secured in the free end holes of the Fishplates is a Pivot Bolt on which a ½ in. Pulley 65 is mounted between the Fishplates, this assembly representing the lifting tackle usually fitted to showman's traction engines. A 7½ in. compound narrow strip 66, built up from one 4½ in. and two 2½ in. Narow Strips, is attached to each side of the canopy by three Angle Brackets, positioned as shown. All the holes in the compound strip are fitted with Set Screws to represent lamps.

Finally, a removable chimney extension 67 is supplied by two Short Couplings, each separated from an ordinary Coupling by a Washer, all being mounted on a 2½ in. Rod, using 7/64 in. Grub Screws. The assembly is held between the free lugs of four Angle Brackets bolted to the canopy, where it is held by 7/32 in. Grub Screws protruding from the Couplings through the holes in the Angle Brackets' lugs. The finished canopy is then mounted in position by fixing Threaded Pins 62 and 63 in Rod and Strip Connectors 43 and 20 respectively. With the model completed, it is easy to see why it gained the Meccano Cup for Mr. Halliday !

**PARTS REQUIRED**

4—1b
1—2
2—3
6—5
4—6a
2—9c
2—9f
15—10
1—11
27—12
2—12a
5—12b
6—12c
1—16
2—16a
2—17
3—18b
1—22

4—22a
1—23
2—24
2—24c
1—25
2—26
1—26c
1—27d
4—28
66—37b
144—37a
109—38
2—38d
1—46
4—55a
10—59
1—62
1—62a

3—63
2—63c
2—63d
4—64
64—69
4—69b
24—69c
1—77
1—81
1—82
1—103e
3—103f
2—103g
3—103h
2—111
7—111a
16—111c
7—115a

1—No. 1 Clockwork Motor Drive Pinion

1—125
1—133a
4—136
4—137
1—147b
1—147c
1—154a
1—155
1—171
3—176
6—194
10—212
4—231
4—235
2—235d
3—542
1—543
6—544
6—651

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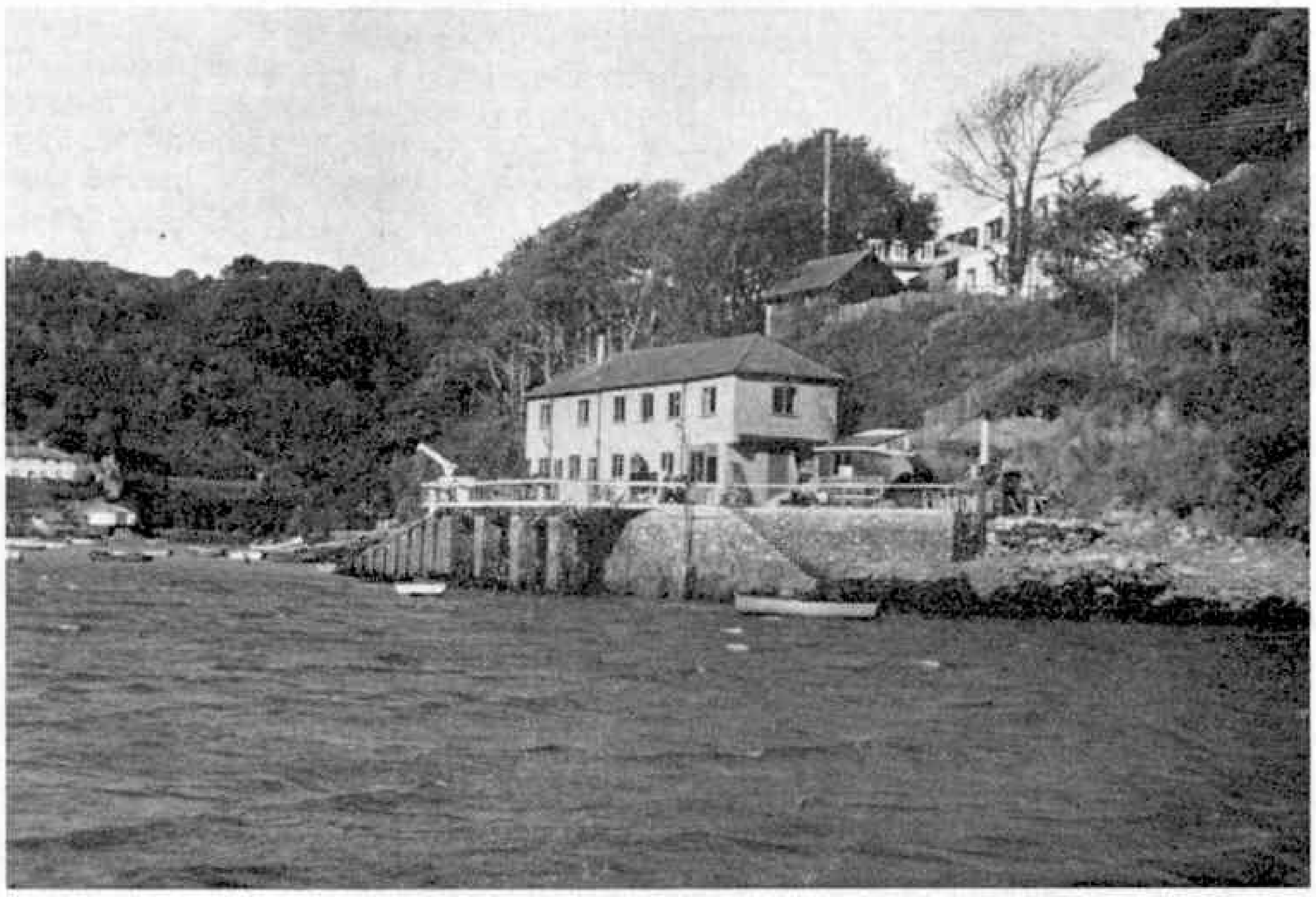
# PREVENTING SHIP FOULING

### by Alan P. Major



The Red Hand Marine Coatings Station at Newton Ferrers in Devonshire.

AT THE DEPARTMENT OF BOTANY, Leeds University, Yorkshire, Dr. L. V. Evans, in collaboration with Dr. Christie, a biochemist working for International Red Hand Marine Coatings at the latter's Newton Ferrers Marine Biological Station,

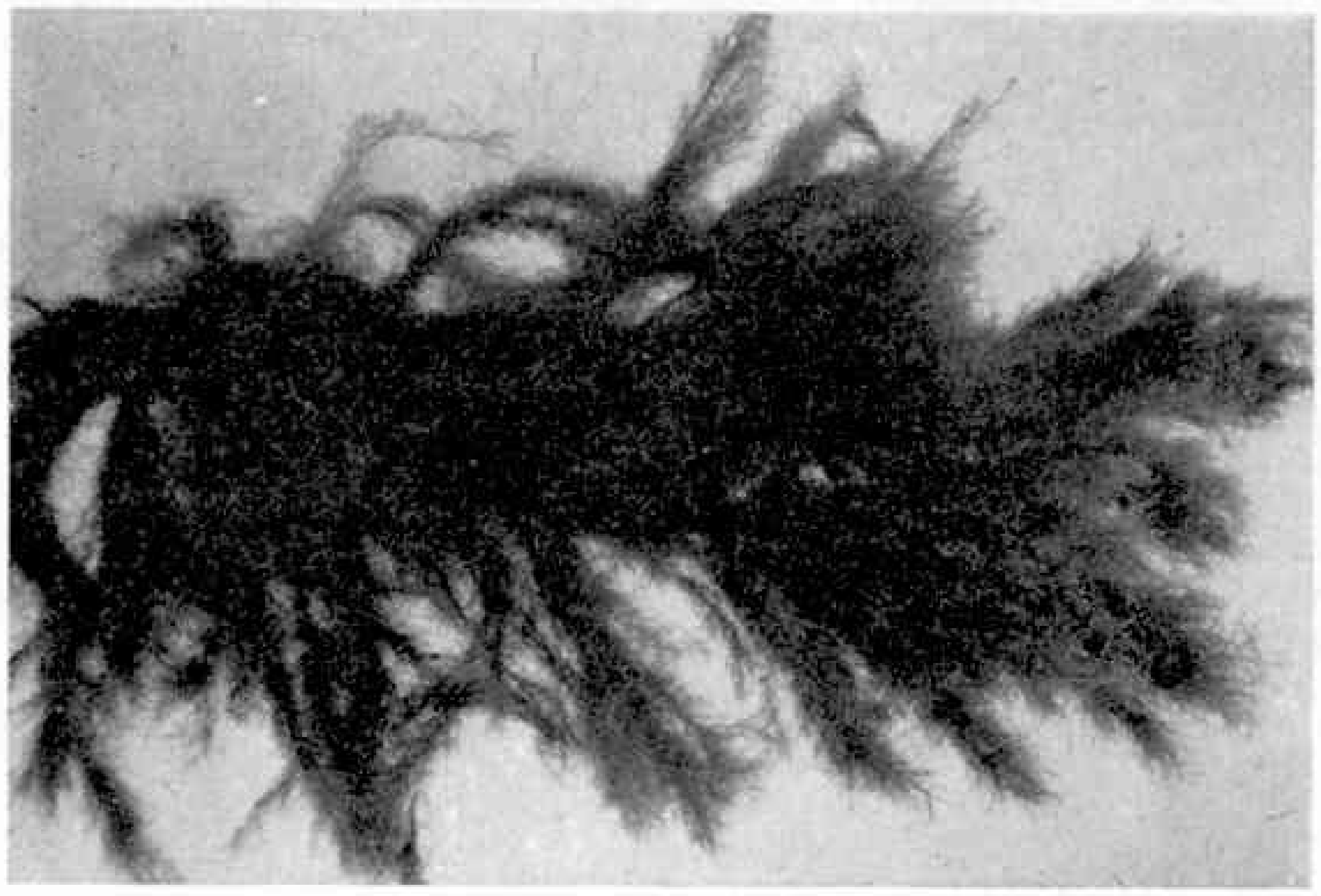
(Continued overleaf)

At present under study at the Newton Ferrers Marine Biological Station is *Entromorpha*—Green Seaweed.

Devon, are investigating the fouling of ships caused by seaweeds. A study is being made of the structure and biochemistry of the swimming, settling and newly-settled zoospores of the green seaweed Entromorpha, which is the most serious fouling growth, particularly upon large modern tankers, also the red seaweed Ceramium and brown seaweed Ectocarpus. By using an electron microscope and biochemical techniques they are trying to discover the mechanism involved in zoospore settlement, the chemical nature of the adhesive used by the seaweeds to attach themselves and where it comes from within the cell. When this is discovered it is hoped then, when certain technical problems have been overcome, to develop a new anti-fouling substance that can be manufactured commercially which will dissolve the glue biologically instead of chemically and the seaweeds, barnacles, etc., cannot grip and develop.

Sea water contains millions of floating microscopic plant and animal life called plankton, among it being the young spores of these growth weeds and creatures. Ships sailing through the sea come into contact with them and some attach themselves to the vessel's hull where they, if allowed, would develop into adults. When in sufficient numbers these considerably slow down the ship, could damage the hull and are costly to remove.

In shipping language there are two kinds. One is "grass fouling", including true seaweeds and creatures which resemble this type of plant, and, secondly, "shell fouling", including the acorn and goose-neck barnacles, mussels, some kinds of oyster and sea worms. With wooden vessels there is also the damage caused by wood-boring shipworms.



Beautiful *Ectocarpus (Pylaiella)* looks like fur and falls into the 'grass-fouling' category of sealife.

This is no new problem. As early as the 5th century B.C. seafarers were trying various ways of keeping their ships' hulls clean. Plutarch, a Greek writer, in 120 A.D. complained how often it was necessary to scrape "the weeds, ooze and filth from the ships' sides to make them go more easily through the water."

The ancient Greeks and Romans every few months hauled their ships on to dry land, put them on their sides and laboriously scraped the keels and hulls to remove the unwanted growths.

It was soon realised prevention was better than cure. Various methods were tried. The Phoenicians painted on a tar substance. Viking raiders, knowing speed was essential for their warships, used a material they called "seal tar". The Greeks tried a mixture of arsenic and sulphur in oil.

Many a ship heavily loaded with cargo broke up at sea under the strain through her timbers being weakened by the tunnelling of shipworms inside them and weight of weeds and barnacles on the sides. To try and prevent these worms and weed fouling the Romans tried covering parts of the hull with lead plates which the shipworms could not penetrate, but these proved too heavy and slowed the ships. The Phoenicians tried thin copper sheets, which were successful but soon corroded and needed replacing. The Greeks also tried layers of cloth or paper over which they fixed thin lead plates with copper bolts.

English shipyards also tried various methods through the centuries. In Henry VIII's reign layers of animal hair and tar were spread on and then covered with wood, so, it was hoped, the shipworms would bore in so far and no further. Lead and copper were also used but captains complained of the dead weight of their ships. In the 16th and 17th centuries English shipbuilders went back to wooden sheathing, using brimstone, tar, pitch, "oyl", sulphur, tallow, animal grease, to try and protect it from fouling and worm penetration. The Portuguese even tried burning the outer surface of their wooden hulls to a depth of several inches, making allowance for this in construction, so the charred wood prevented weed growth.

Copper sheathing was used for British naval ships in the 18th century, when H.M.S. "Alarm" was sent to the West Indies in 1758 "for an experiment of proving it against the "worm". It was successful, the copper when in contact with water releasing poisonous ions which either killed or crippled the growth spores and worms as they attempted to settle on the metal. Copper was, following this, widely used, so British naval ships could easily overtake French warships still laden with fouling, the only snag being that where the copper touched iron the metals corroded and much research was done to find something which could be used to avoid this.

The rapid development of iron for ships' hulls after 1800 made copper obsolete, but though this prevented shipworm penetration, fouling and now corrosion was still a problem. Copper covering could not be used over the iron because the electrolytic action between iron and the copper caused corrosion. Wooden sheathing did not stay in position over iron for long because the bolts corroded and snapped off. The problem became so great the Admiralty even considered the disuse of iron ships and planned to sell off the Navy's iron warships.

But scientists and others started to try and find a

" paint " composition to prevent corroding and fouling at the same time, going back in history to use methods previously used by ancient seafarers. About 1850 mercury poisons in an oil-type paint were tried and though successful took too long to dry after application.

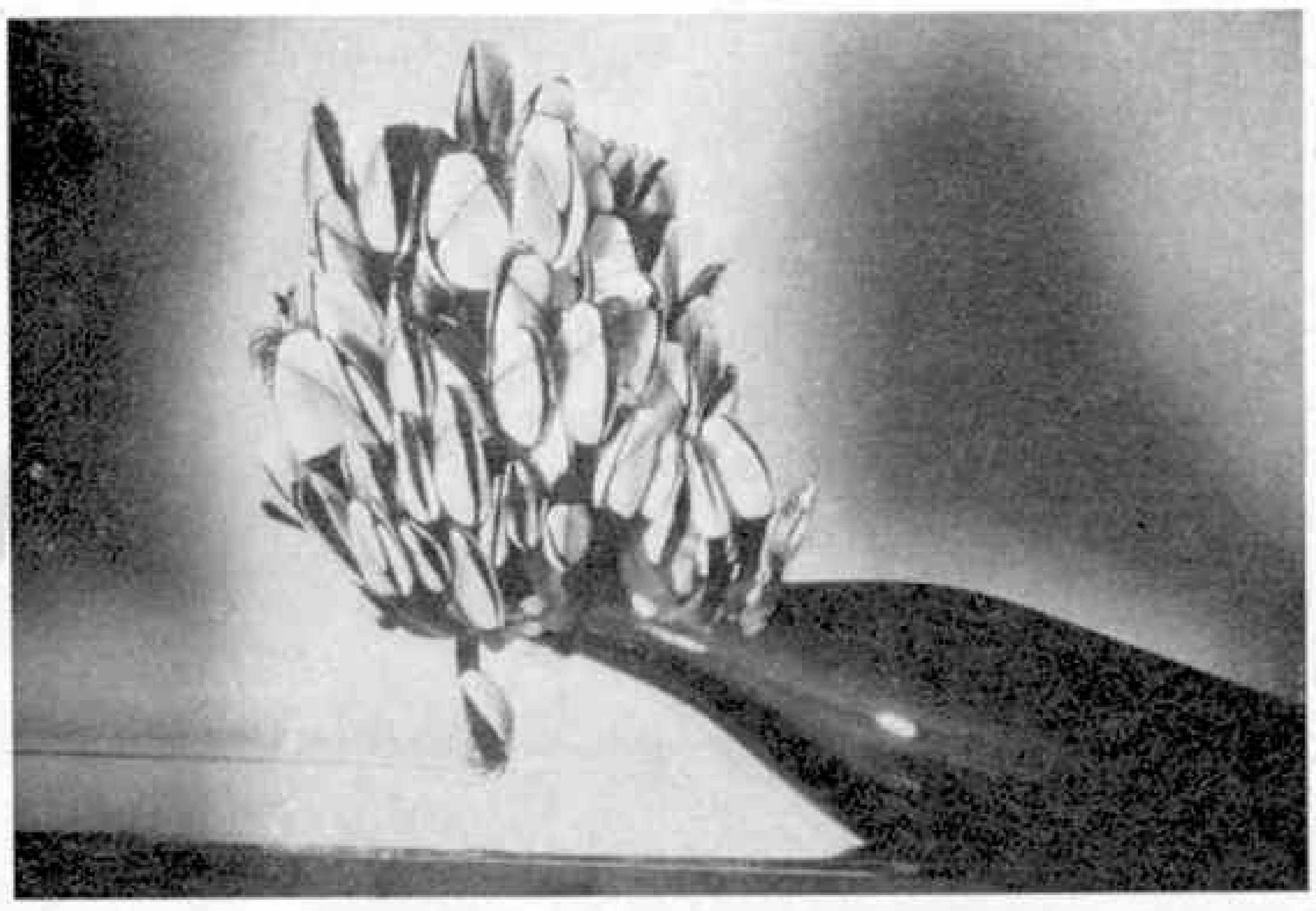
Realising there was a fortune awaiting the person who invented a successful paint for ships' hulls for this purpose between 1835 and 1865 three hundred patents for anti-fouling compositions were issued in Britain. Most of them were useless.

The first really successful product was a metallic soap, containing copper sulphate as the toxic, called " McInness ", in 1860, applied hot over a priming paint consisting of iron oxide pigment and resin varnish. Another method introduced shortly afterwards was a hot plastic composition called " Italian Moravian " which was still being used in the early part of this century. By 1900 several " paints " were being manufactured for this task and present-day anti-fouling paints are basically the same, with various substances contained in them to prevent fouling by poisoning the seaweed spores, barnacles, mussels, etc.

The fouling of ships' hulls can still be a big expense for ship-owners because of the loss of speed delaying arrival dates, excessive fuel consumption and the cost of docking and cleaning. The modern merchant ship usually dry docks every nine to twelve months or less for repairs, surveying of the hull and painting it, by spraying, rolling or brushing, with anti-fouling composition and paint to prevent corrosion during this time. For economic reasons more ship-owners are now keeping their vessels out of dock for longer periods and at sea cargo carrying and earning income, so the paints now have to last longer, too.

In recent years firms manufacturing such paints have set up laboratories and marine stations to make a scientific study of poisons in relation to the marine growths and to increase the efficiency of anti-fouling compounds in use. Simply, an anti-fouling composition forms on drying a kind of microscopic mesh and the hollows in between are filled with poisonous material, or alternatively a very thin honeycomb, the tiny cells being filled with poison. Gradually the poisons dissolve in contact with sea water and envelop the ship in a porous skin containing and exuding a poisonous liquid at the surface which kills or cripples any microscopic marine growths that attempt to attach and grow on the ship. To obtain the best results several factors have to be controlled. One is the solubility and toxicity of the poisons which would soon come to an end after a short use if too quickly dissolved out and washed away from the composition. Fortunately, poisonous compounds are known which, while dissolving very slowly in sea water, can still produce a solution poisonous enough to act as required. The second factor is the size of the cell structure of the paint film which must not be too large otherwise they empty of the poisons too quickly, but they must not be too small or they will not do the job intended for them. It is possible to regulate this so that control is exercised over the rate of poison wastage. Other factors that have to be considered are the control of the correct amount of poison in the paint to be applied per unit area of the surface to be protected, and the influence of temperature, salinity, etc., of the sea and its effect on the paint film and its functioning.

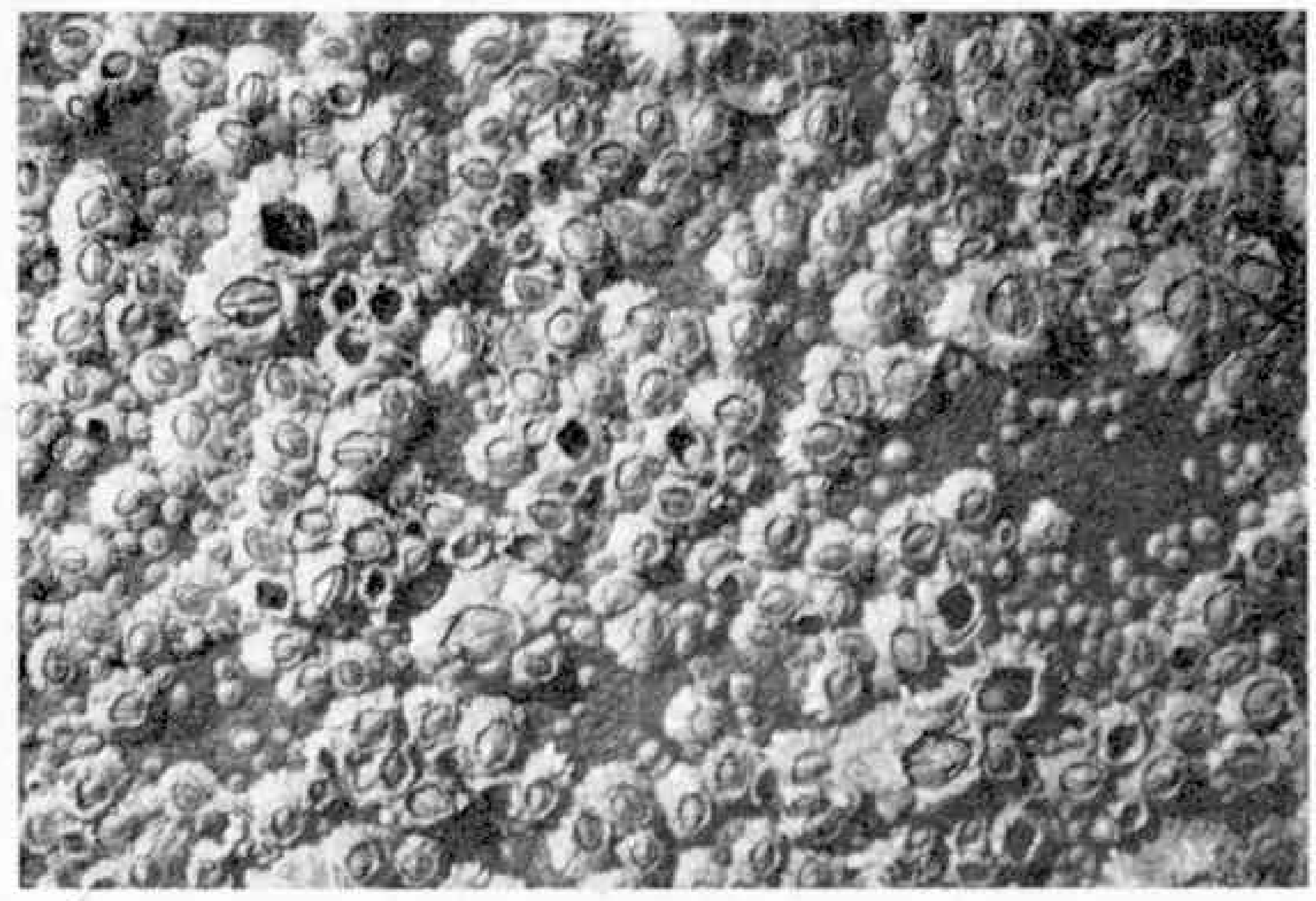
Requirements also differ between those anti-fouling compositions for ocean passenger liners and warships, who may be used on regular routes and conditions, and merchant ships, which may be general purpose and thus have to journey into all kinds of climates and sea conditions.



**Stalked Barnacles are seen here in a lab. test growing on the neck of a bottle. Imagine how they would affect the performance on the hull of a boat !**

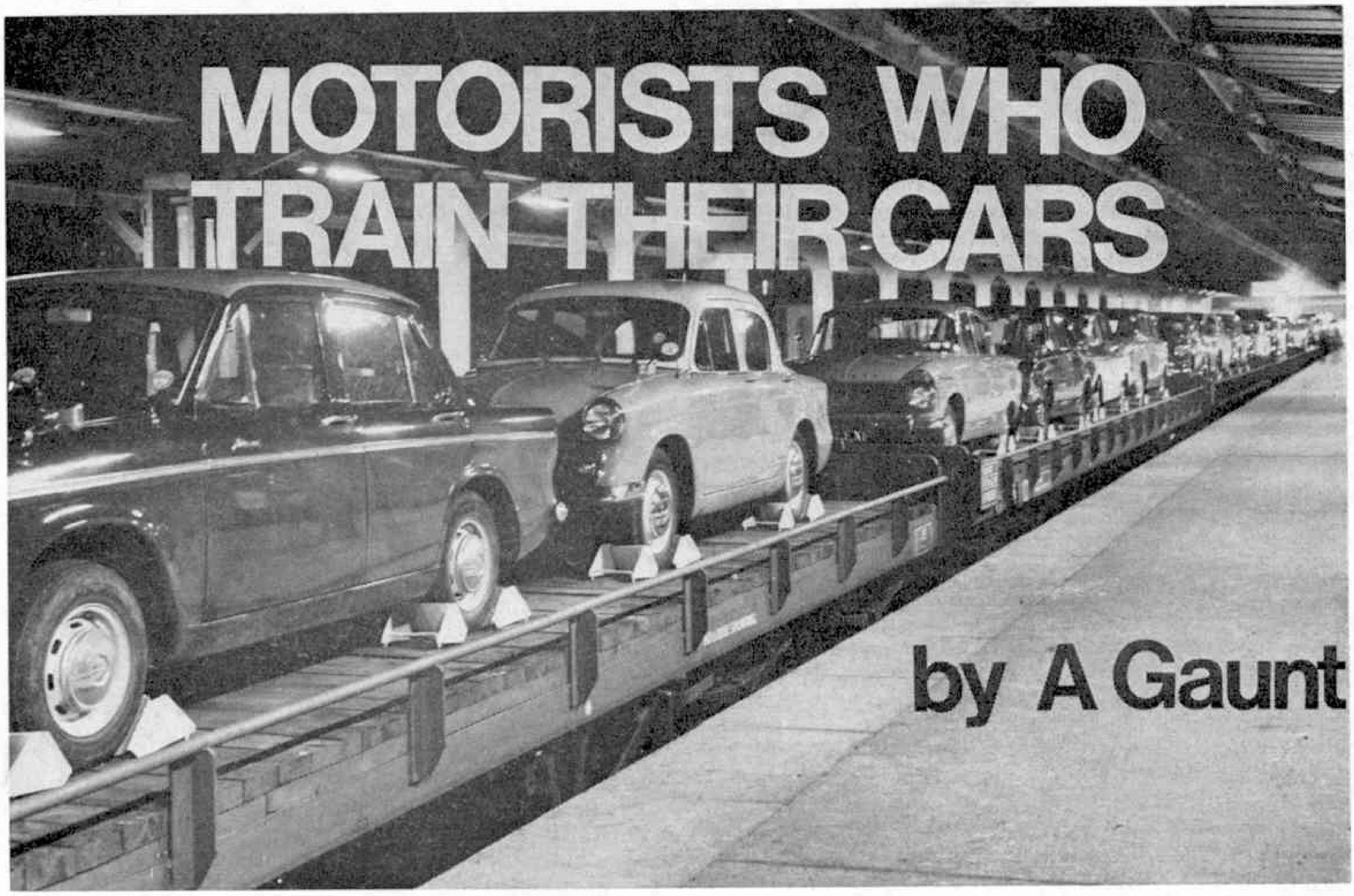
One of the leading companies manufacturing anti-fouling compounds is the International Red Hand Marine Coatings, who first established a research station for work on this problem in 1928. At their marine biological research station at Newton Ferrers, Devon, the phenomena of fouling and how to overcome it is observed and studied. As well as the laboratories, rafts are maintained in the harbour there and elsewhere, including tropical waters, where carefully controlled experimental trials of compositions applied to panels of metal or wood are kept immersed in the sea and records kept of their life history and progressive performance. Now compositions successful here are then applied as patches on sea-going ships, where their merit can be assessed alongside the standard commercial compositions. From this to quarter or half ships provides the final test determining the value of a new composition. If it passes through these tests and proves successful it may eventually be put into commercial usage.

The author wishes to acknowledge with grateful thanks the generous assistance of Dr. L. V. Evans of the Department of Botany, University of Leeds; International Red Hand Marine Coatings; and the Ministry of Agriculture, Fisheries and Food, in the preparation of part of this article.



**A common sight on all our rocks are these Acorn Barnacles—another troublesome form of marine life that our shipping could do without.**

# MOTORISTS WHO TRAIN THEIR CARS



### by A Gaunt

**Holidaymakers are finding that they *can* "take it with them," when "it" means a car and "taking it" refers to a long run by train! In fact, the Motorail service for holiday motorists going to faraway places in Britain at the start of their vacation has grown remarkably in popularity since it was introduced fifteen years ago, and this year it has had a greater appeal than ever before.**

IF YOU'VE SEEN an express passenger train speeding ahead with several single or two-tier trucks loaded with cars among the rolling-stock, it doesn't mean that British Rail are doing car dealers a special favour by speeding-up the delivery of some urgently needed motor vehicles.

The sight may be your introduction to " Motorail," an innovation dating from 1955 for the benefit of motorists. The first of these car-trains linked London and Perth, and it was so popular that it has since been developed into a much wider service. It has been especially welcomed by holiday motorists, but it has also been found a boon by businessmen, show biz people, M.P.s, doctors, and lots of others who want to make long journeys without facing the frustrations and hazards of today's roads, yet who need to have their car with them when they reach their holiday area or the region they are to cover for business purposes.

The basic idea is that the holiday driver and his family or friends travel by train for the trunk journey. The car travels on a special railway vehicle attached to the same train. Thus, a long day or night of driving on congested highways is avoided, and the same mileage is covered in a much shorter time. Totnes, 200 miles from London, can be reached by " Motorail " in a little more than four hours, and it takes the motorist only nine hours to cover the 450 miles from London to Perth at the start of a holiday in Scotland—it he entrains his car. Reaching Stirling from the Liverpool or Manchester areas means a Motorail run of less than five hours. Moreover, meals and refreshments can be taken while travelling, a time-saving arrangement compared with the stops necessary on a long-distance road journey.

On the longest Motorail routes, such as London to Scotland and Newcastle to the South West, sleeper accommodation is provided. Putting your car aboard your holiday train can save time that adds up to two extra days on holiday, as well as letting you relax on the journey instead of being subjected to tiresome delays and congestion on the roads. There's no petrol to buy, either ! Because the journey is done in a single stretch, and because you can sleep on the train if you travel at night, Motorail also saves the cost of an overnight stay at a halfway point—as you may have to do when making a long road journey to and from your holiday area. The saving can be set against the Motorail fare.

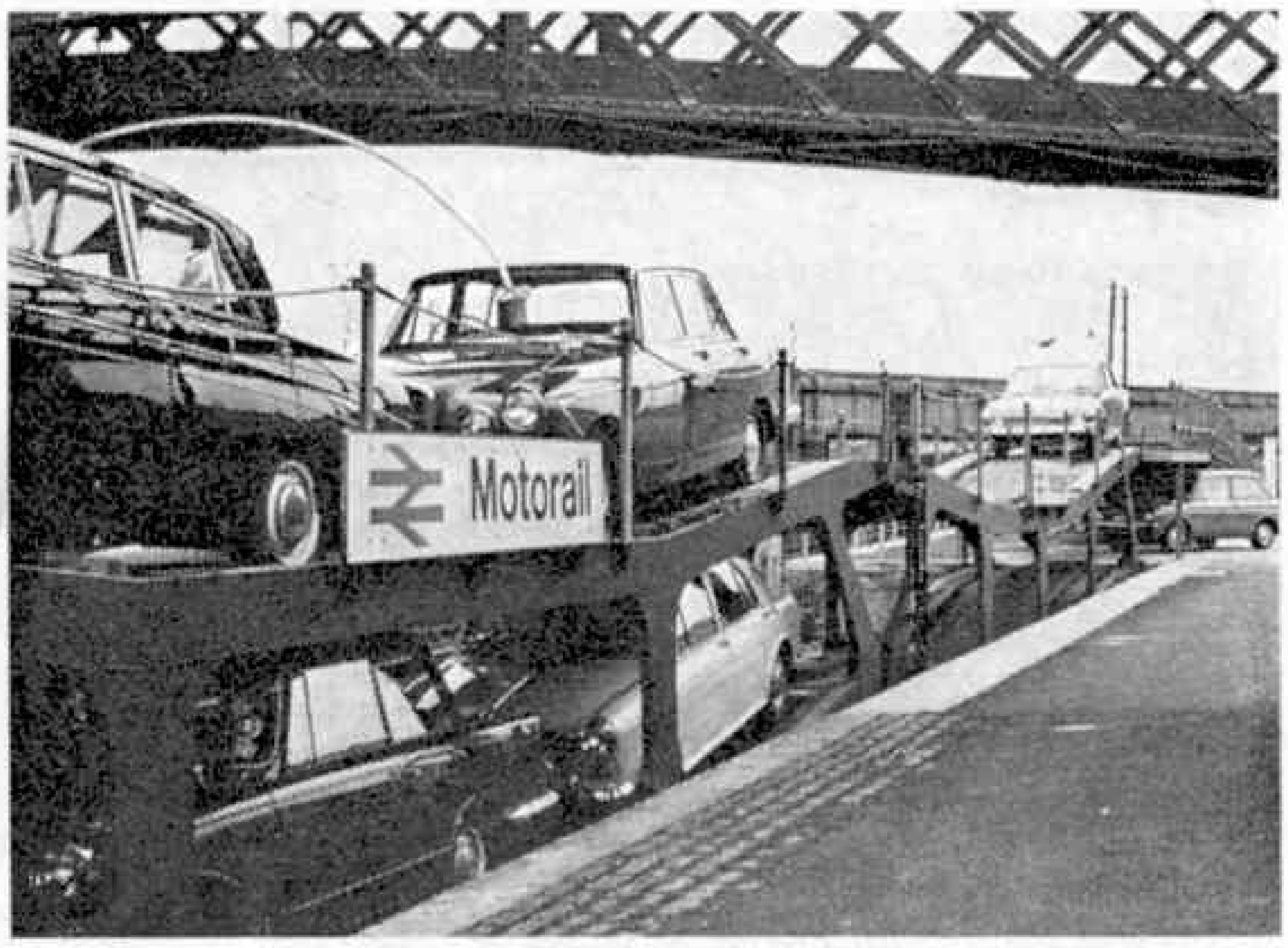
Businessmen can leave their office in the early evening, dine on the train, sleep away a few hundred miles, and arrive rested and relaxed to drive away first thing next morning. No wonder that the number of car-users taking advantage of the service has grown gratifyingly since it was first offered fifteen years ago. By 1967 the number of routes operated by Motorail had expanded to fifteen. This year the network has provided no fewer than 22 services linking all the main areas of population with the holiday areas of Scotland, the West Country, Wales, and Ireland. Ireland can be reached from London by the Motorail route going to Fishguard and connecting with the Rosslare drive-on drive-off car ferry service. Another way of getting to the Emerald Isle is by using the London-Carlisle Motorail service, introduced this year, and then driving through South West Scotland to join the Stranraer-Larne drive-on drive-off car ferry.

Many motorists bound for the Continent this summer have been cutting out the long haul to the Channel ports by making use of the Motorail services to London, leaving only a comparatively short drive from London to the South Coast. New Motorail services started this year include a nightly one from London to Stirling, and one from London to Carlisle operating every day except Sundays. Another innovation in a Saturday service from Worcester to Newton Abbot, and one from Birmingham to St. Austell, Cornwall. When this advancement in railway facilities was first introduced between London and Perth in 1955, the cars were conveyed in covered vans, and the service was limited to night journeys on trains with full sleeping accommodation for the passengers. The first daytime services became available in 1960, and these followed the pattern of the overnight trains, although the passengers travelled in day compartments.

As recently as 1967 the Motorail service between Cardiff and the West Country conveyed the cars in covered vans, but the present arrangement in general is to load them on to either flat-deck or two-tier high capacity switchback " Cartics," four-vehicle articulated railway units each capable of carrying up to 32 cars. The " Cartic " has in fact resulted partly from the change-over from steam to deisel and electric traction in Britain. When steam locomotives were in general use ir was necessary to carry the cars in covered vans for protection from the smoke and sparks of the engine hauling the train. Nowadays such protection is unnecessary and the cars can be carried on open rail vehicles.

This year British Rail have been able to transport well over 10,000 more cars by Motorail than in 1969, itself a record-breaking year, and the total number of car spaces available has been increased to 107,000. This service for motorists has doubled its capacity during the last four years. Not only have new routes been introduced but more frequent runs have been provided on older routes as well. Many of the seasonal services this year have been extended over a longer period too. Some of them operate now from mid-April to the last week in September. A number are all-the-year round services. Special railway terminals have been set up in different parts of Britain to handle this specialised traffic. London's car-train terminal adjoining Olympia Station, Kensington, was opened in 1966.

The first of its kind in the world, it was designed to be the home of all the London-based Motorail services, and serves as the focal point for the network. Careful consideration has been exercised in siting the Motorail terminals, for it has been realised that for convenience they must be at good focal points in the road system as well as at the focus of railway routes. The Birmingham terminal is located at Sutton Coldfield, about eight miles from the city centre, offering good access for motorists from a wide area of the east and west Midlands. In Yorkshire, Sheffield has been chosen as the terminal for the West Country service, and York has been selected for the Scottish run.



**' Cartics ', the type of car-carrier seen here, enable as many as 60 cars to be transported with passenger trains conveying holidaymakers and businessmen to distant destinations.**

The opening of the M.6 motorway has made Newton-le-Willows, about midway between Liverpool and Manchester, a suitable point for a terminal linking Lancashire to both Scotland and the West Country. It is reasonably accessible for motorists over a large catchment area. Stirling, where the scale of Motorail operations has undergoine a big increase this year, is well situated for people wanting to travel from the Lowlands to London or other parts of England with their cars, and is equally well sited as a gateway for Motorailers travelling to Scotland. All the terminals are organised and manned for the loading and unloading of cars safely and swiftly, and the routine is simple. After calling at the reception office, the motorist drives to either a parking area or the waiting train. While his car is being loaded he and his party can sit in the lounge where snacks are obtainable. They can buy newspapers and magazines, watch television, or freshen-up in the washrooms. Keynote of the Motorail terminal is informality, and although a reservation form must be filled in when a booking is made (giving the length, height and width of the car) the details required are kept to the minimum. With a wallet containing the tickets is provided an information sheet showing how to reach the terminal, what time to arrive, and other helpful details.

Nowadays the postbag at the central reservation office at Olympia Motorail station tops 2,000 letters a day in the busy season—January to August—and there are about 1,000 enquiries by 'phone and personal callers each day. A typical Motorail train carries 100-150 passengers in modern inter-city day coaches or inter-city sleeping coaches, together with 30-60 cars. Motorists may either drive their own cars on to the train or hand their keys to experienced B.R. staff to do the loading. Then B.R. take over and the holiday begins. The range of amenities at the Motorail terminals varies, but a policy of steady improvement in the quality and growth of the service on the established routes is

"Bunk service" at the touch of a bell-push is a pleasure enjoyed by motorists and passengers who go by rail.

reflected by the fact that the number of carryings is doubling every 4-5 years.

The best compliment to Motorail is that more than half the passengers carried last year had used the service previously, and whereas British Rail are used to getting more brickbats than bouquets, with Motorail it's different. Stacks of letters have been received from satisfied customers who have been impelled to write-in saying how pleased they have been. The emphasis throughout Motorail is on personal service, with resulting appreciation from motorists and other passengers. Children especially find "going Motorail" an adventure. This experience is heightened if the journey includes a walk along the corridor to the dining car for a meal, or going to bed in a sleeper berth. Bedding down in a bunk in what looks like a ship's cabin, and with Dad's car on the same train—it all adds to the fun of a holiday! Sleeper berths are usually two to a compartment, with hot and cold running water, drinking water, soap, towel, mirrors, heating, individual lighting, a point for electric shavers, and heating and ventilation control. Room service from an attendant for tea and biscuits or information is only a bell-push away. Luggage presents no problem. The motoring party take on the train only those items they will need on the journey. The rest (other than those on roof racks) can be left in the car as usual.

Boats on trailers can be carried by Motorail, at a cost which works out at roughly two-thirds of the car-and-driver charge. By using Motorail the long-distance holiday or business motorist need not worry about the weather or traffic jams. They won't stop him and his car from arriving on time—fresh, relaxed, and really ready to enjoy that long-awaited hard-earned holiday, or to carry out business engagements hundreds of miles from his office. And, in essence, the Motorail service isn't a complete novelty. After all, it is a land version of the car ferry services used by motorists going to European countries, such as France, Spain, Italy, Germany, Scandinavia and other parts of the Continent.

The chief difference is that, unlike the sea-ferries, which *must* be used to reach the Continental mainland with a car, the Motorailer in Britain entrains his car by choice and not by necessity. And that's a point not to be overlooked in drawing attention to this fast-spreading B.R. service.

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# HAVE YOU SEEN ?

## New Revell Aircraft Kits

Revell have just released four new aircraft kits to add to their already impressive range, three of which are 1/32nd scale aircraft which took part in the Second World War. First is a model of the Supermarine Seafire, the carrier based version of the Spitfire. Being 1/32nd scale means an exceptional amount of detailing in the model which, when constructed measures over one foot from wingtip to wingtip. Finer detailing points mentioned include the Rolls Royce Merlin engine, retractable landing gear with moving wheels and instrumented cockpit details. Construction is very straightforward and when completed the model looks quite impressive. Price of the Spitfire is 16/9d.

The second kit is of a Messerschmitt BF109G Gustav, and has all the detailing one would expect of a 1/32nd scale model. Once again this one builds up into a very impressive model and even includes a detailed pilot complete with flying suit.

The third kit is of a rather less well-known aircraft, this time an American Curtis Tiger and is very similar in detail features as the two former kits. A very nice decal sheet is one of the more impressive features on this one.

Price of the Supermarine, Curtis Tiger and ME109G is 16/9d. each.

The fourth release from Revell is a 1/144th scale model of the United Airways DC-8 Super 61 passenger aircraft. Construction is fairly straightforward as there are surprisingly few parts in this kit, which is moulded in off-white plastic. A set of decals is included and on full completion is a handsome model.

Price of this one is 15/9d. **(Continued on page 662)**

# MECCANO CONSTRUCTORS GUIDE

### *by B. N. Love*

### *Part 12*

## *ELECTRICAL CIRCUITS FOR MOTORS AND LIGHTS*

SO MANY TYPES of electric motor have been available to the Meccano enthusiast over the years that he may well be confused at times as to what is required in the way of power supplies and, as the number of transformers and controllers is equally profuse, a short explanation of general requirements may help to clarify the matter. Essentially, two types of Meccano motor are available to the constructor, one being known as a " universal " type and the other as a D.C. type. For a period of some 40 years or more, Meccano Ltd. produced the first type in large quantities and in several patterns, a selection of which are shown in Fig. 1. These are all known as ' side plate ' motors with the exception of the spherical enclosed motor which is affectionately known as a ' cricket ball " type.

All these motors are of the " Universal " type, which means that they may be very conveniently run, *via a suitable transformer*, from Alternating Current (A.C.) as supplied to houses in most parts of the world, or from Direct Current (D.C.) as supplied by a battery or transformer/rectifier.

Alternating Current is constantly changing direction 50 times per second in most European countries and 60 times per second in the U.S.A. Since an A.C. motor consists basically of an electro-magnetic armature driven by repulsion and attraction from an electro-magnetic set of field coils, the change of direction of current, being the same at any instant of time for both the armature and the field coils, means that the magnetic relationship between the two parts of the motor is constant, in terms of direction of rotation. D.C. motors for model driving, on the other hand, commonly have permanent magnet yokes acting in place of field coils, which means that the field of such a motor is not reversible. If such a motor had an armature supplied with alternating current it would try to start and reverse 50 times per second which would result in a complete cancellation of rotation—not to mention a probable burned-out armature! The D.C. motor has several advantages however, since it is only necessary to supply current to the armature.

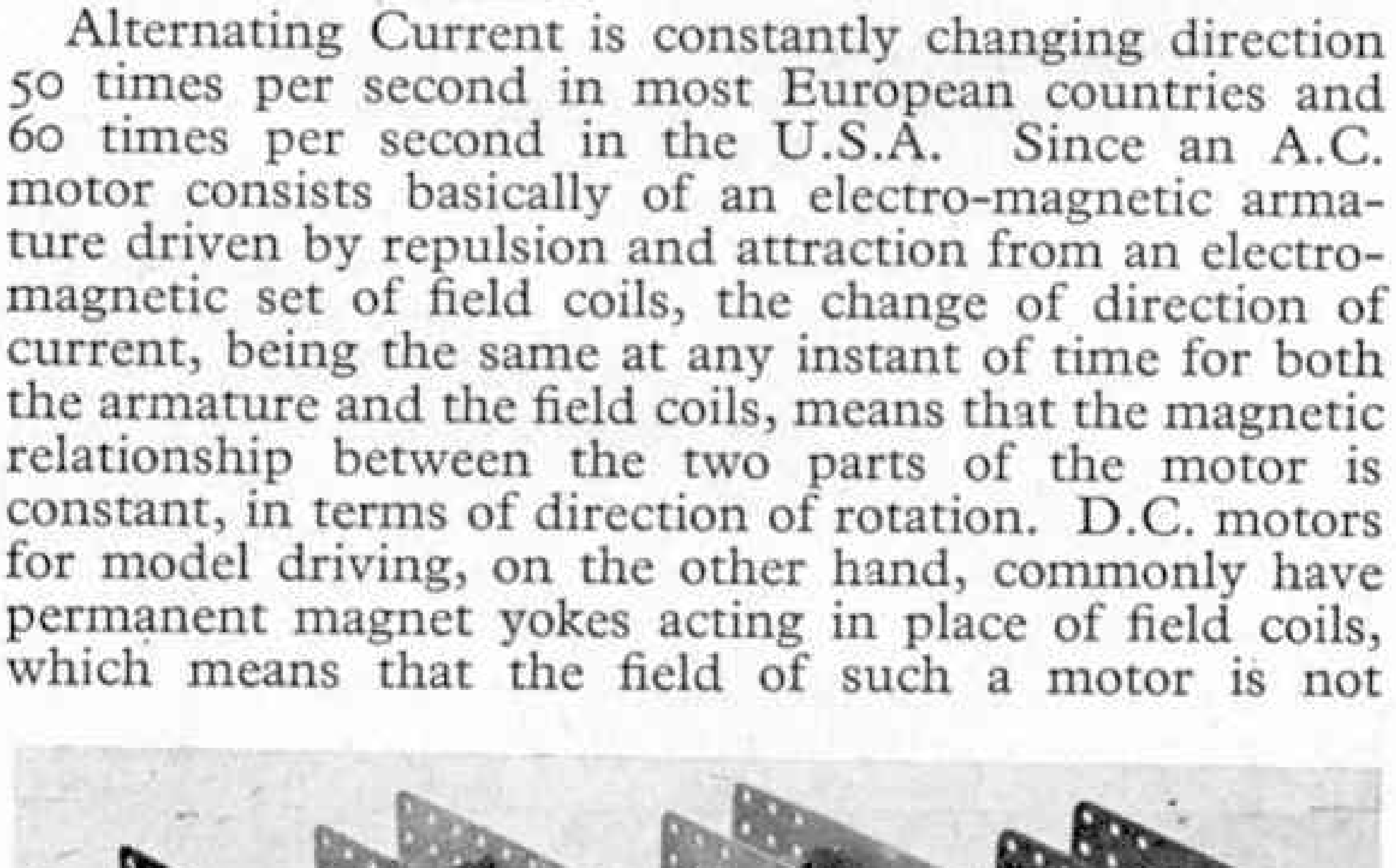


FIG 1

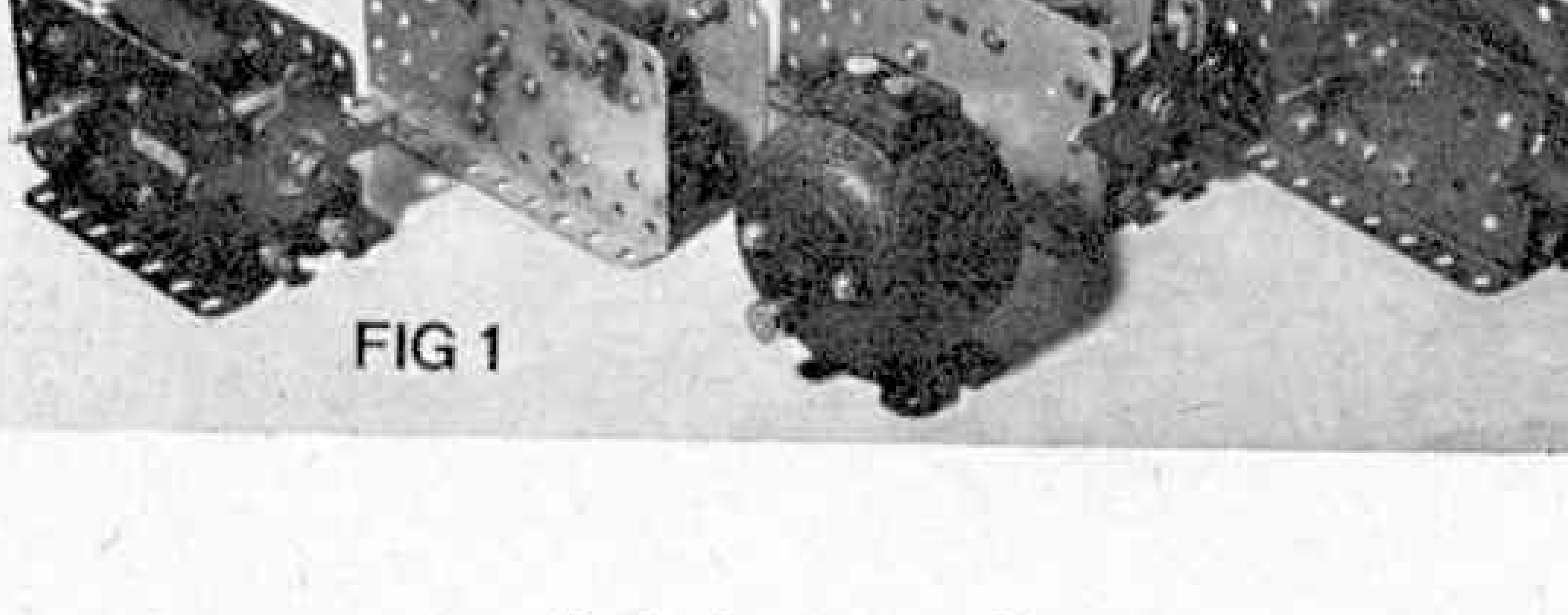


Fig. 2 General arrangement of Meccano 'universal' electric motor showing 'series' wound arrangement for Field coil and armature. *C - commutator *A - armature

With modern development of nickel alloy permanent magnets, motor fields can be very dense and very compact with long life characteristics—a failing in early D.C. motors for model driving. Hence, a battery, fitted with a switch which will change over the feed wire contacts will operate a D.C. motor in either direction and has the great advantage of portability making the model independent of trailing power supply leads.

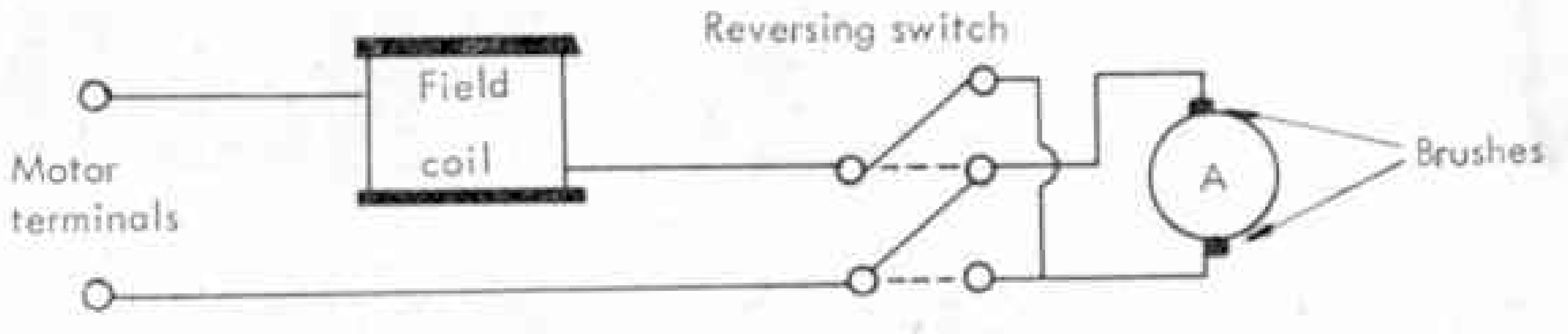


Fig. 2 b. Reverse switching arrangement common to Meccano 6 volt, 15 volt and 20 volt 'universal' (A.C. / D.C.) motors.

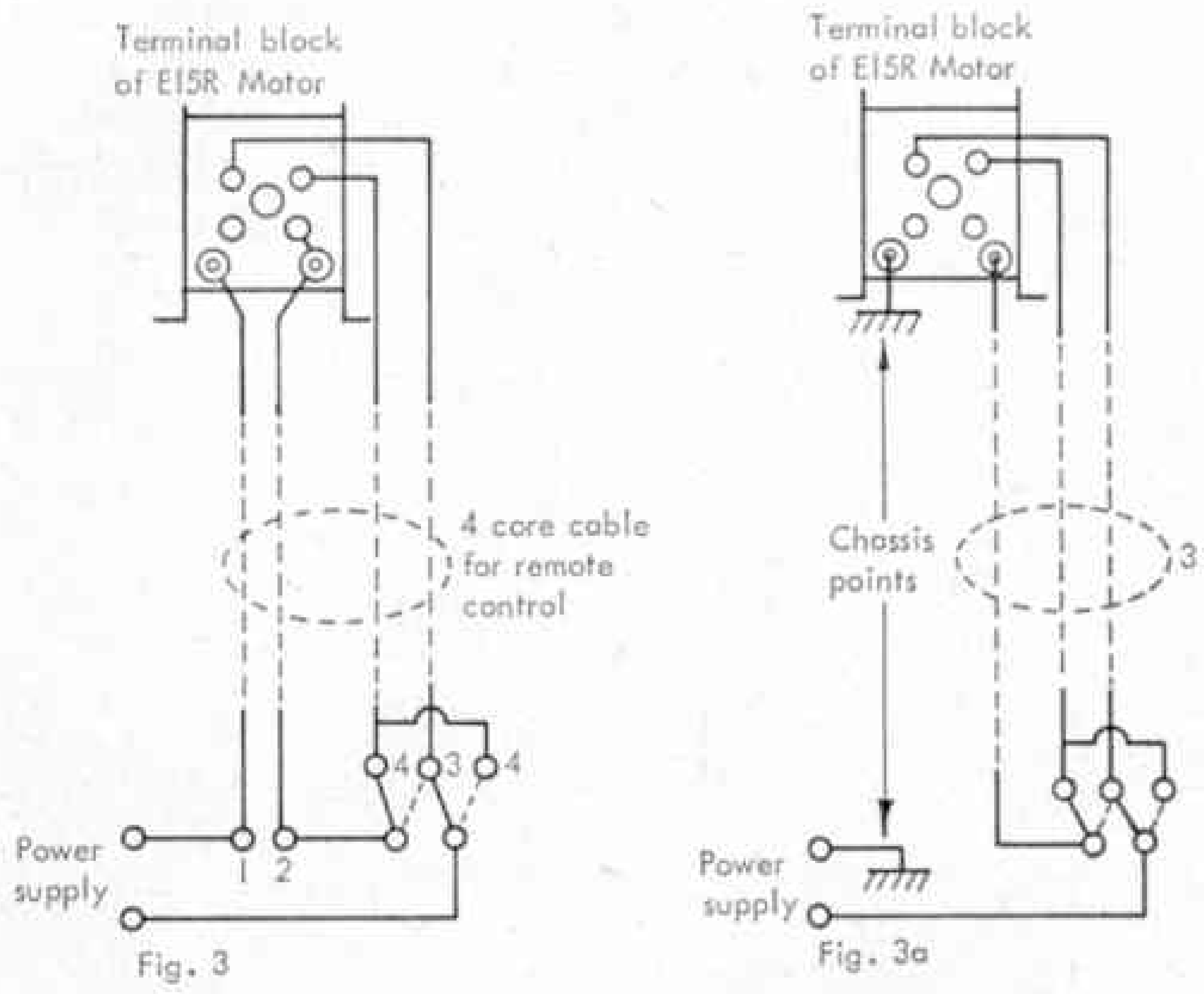

Terminal block of E15R Motor
4 core cable for remote control
4 3 3 4
Power supply
1 2
Terminal block of E15R Motor
Chassis points
3 core cable
Power supply

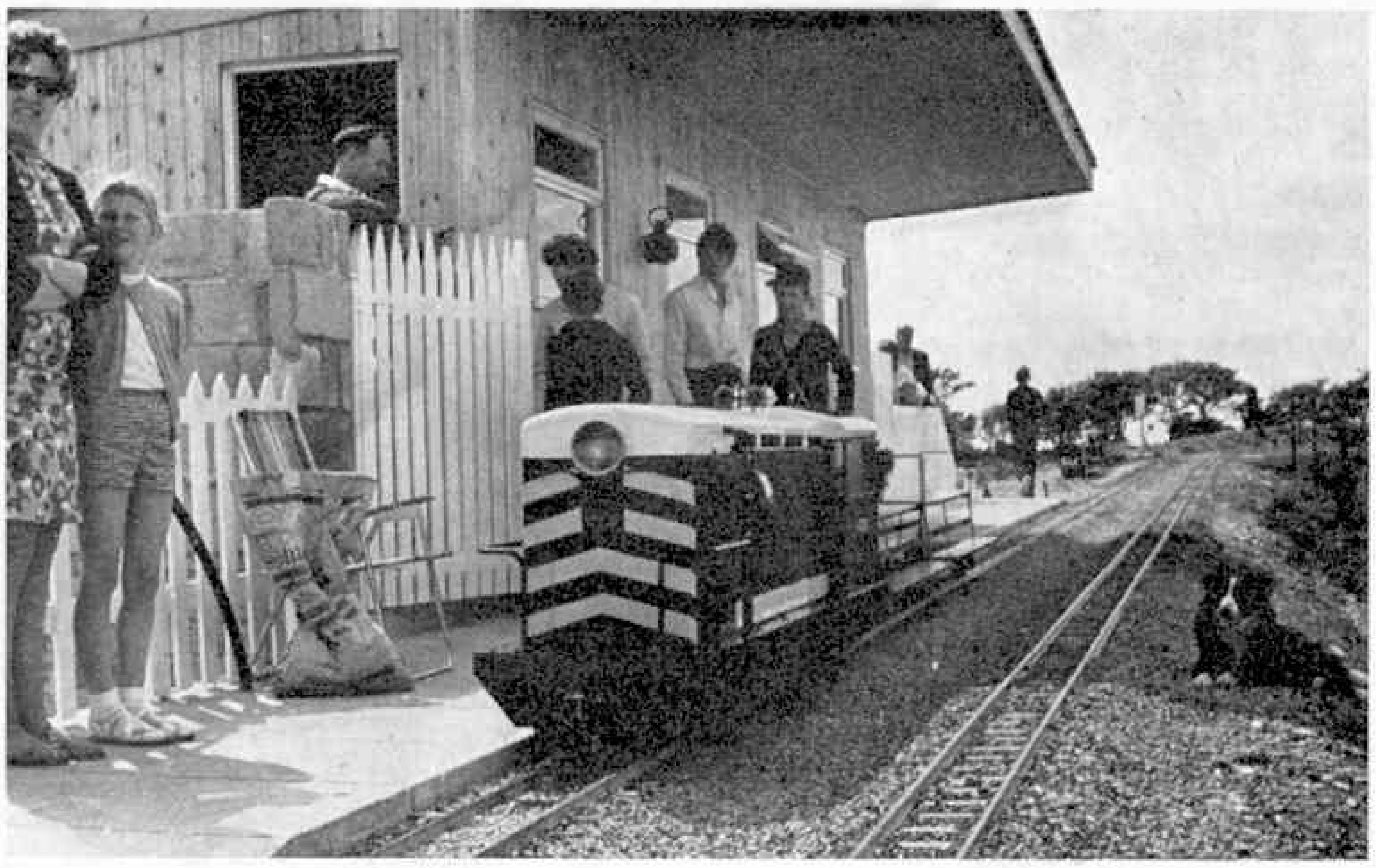
Fig. 3

Fig. 3a

Alternate methods of wiring the E15R and similar Meccano 'universal' motors for reversing by remote control. Fig. 3 - 4 core system. Fig 3a - 3 core system with one lead 'earthed' to chassis model. A Double Pole, Double Throw change-over switch is required for the remote reversing.

Early Meccano motors were intended to be operated from lead-acid accumulators as their current demands and low efficiency made dry battery operation unsatisfactory and very expensive. Four-volt motors were quite common in the early 20's to suit the accumulator but low voltage means high current consumption for the power required. By the late 20's the voltage rating had been increased to 6 volts and attempts made to drive Meccano motors from house mains. Few districts in U.K. were on A.C. supplies and one Meccano motor was manufactured to run from 110 volts, this being supplied from the then 220 volt D.C. domestic supply

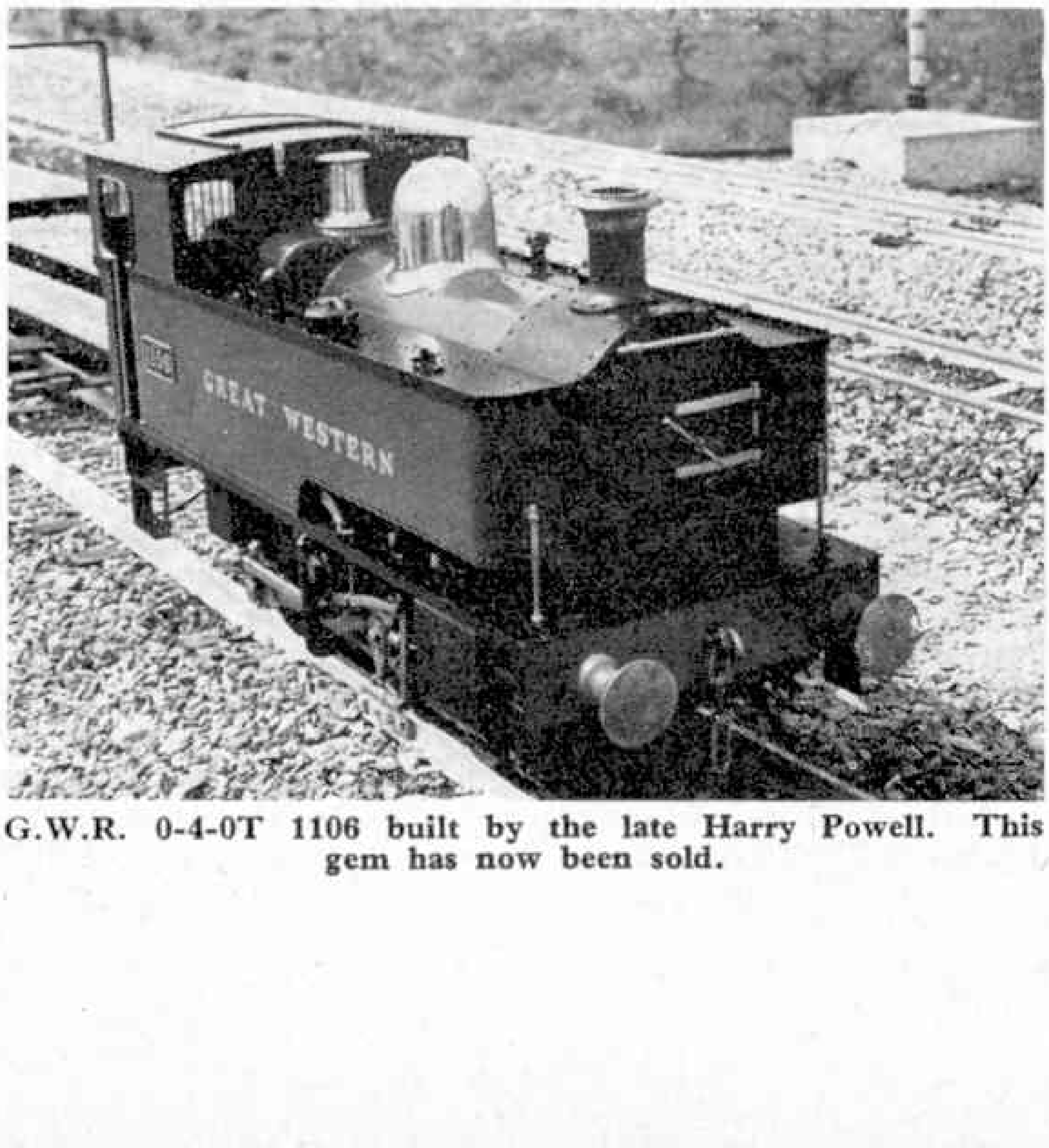
***W. L. D. Bayley describes a new passenger carrying railway recently completed in Cornwall. . .***



# THE FOREST RAILWAY—A NEW CORNISH VENTURE

MAROON PAINT SHIMMERING SOFTLY, 6233 'Duchess of Sutherland' glides gently into the station at Dobwalls to disgorge her load of happy passengers. Steam feathers gently from her safety valve, a shovel rattles on the footplate as more coal is expertly placed in her firebox. This Pacific was certainly built at Crewe—the maroon paint and L.M.S. on the tender leave no room for doubt in anyone's mind. However, *this* aristocratic lady was built in 1939, and shows no sign of her age or Doctor Beeching's axe.

A two-tone horn sounds, an English-Electric locomotive roars past on the through road and the starting signal changes from green to red. Checked by a "double yellow" outside the station, 'Western Warrior' creeps slowly towards the starter. The light changes again to yellow, and with a blast on the horn, the 'Warrior' plunges into a tunnel.

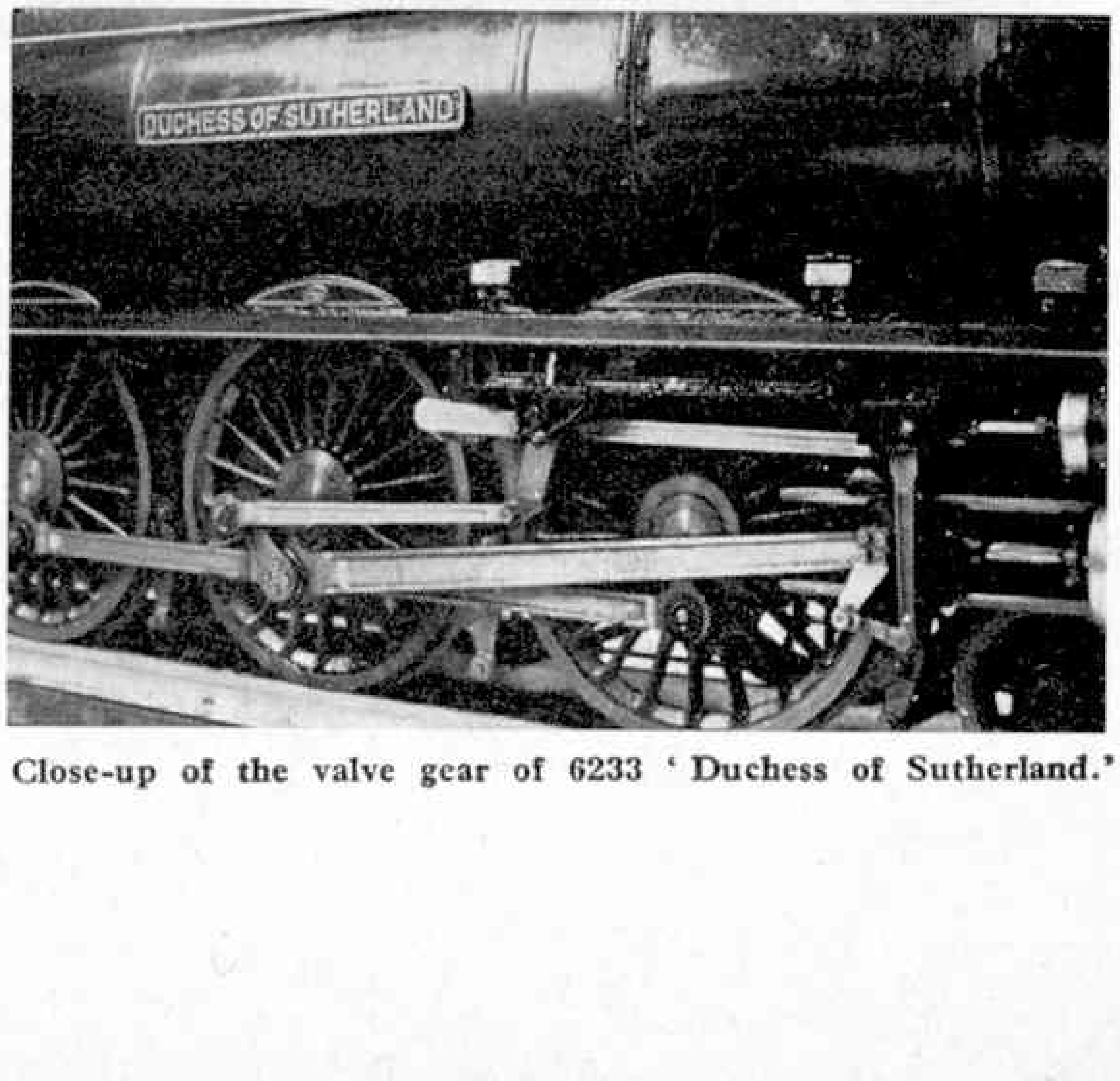


G.W.R. 0-4-0T 1106 built by the late Harry Powell. This gem has now been sold.

L.M.S. steam sharing the same metals with B.R. Diesels? In 1970? Where?

Actually, there is a catch. The locomotives are built to $7\frac{1}{4}$ in. gauge and the passengers return to the station from which they set out. Even so, it is very pleasant to be able to report the birth on Whit. Saturday, 1970, of a new railway system in the heart of Brunel country.

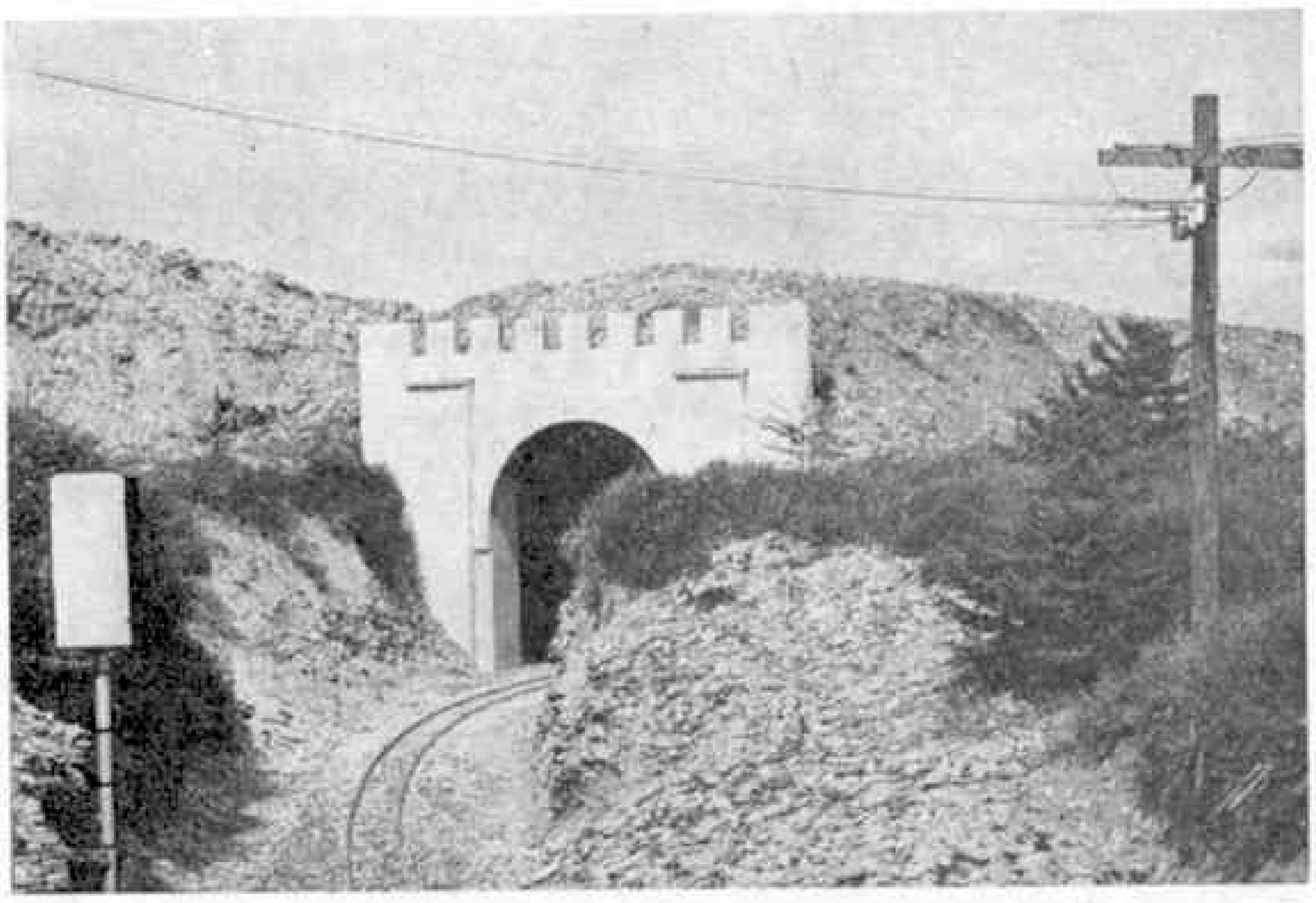
John Southern, owner, manager, Chief Mechanical Engineer and top-link driver of the Forest Railway is a full-time pig farmer. Thirty-nine years of age, married with three sons, he began his progress to the present railway in 1958 with the purchase of a Hornby Dublo layout. Five years later, Southern discovered a partly-built G.W.R. 'King' in 5 in. gauge—and promptly lost all interest in 4 mm. working! He built 100 yards of track for the live-steam 'King', which he completed himself. Three years later he adopted the 'Duchess'. The 5 in. gauge track was torn up,



Close-up of the valve gear of 6233 'Duchess of Sutherland.'

and a start made on the 7¼ in. system. John Southern and his family of boys began marking out the track in October, 1967. Laying commenced in the following July. One year later, 7,000 sleepers carrying 940 yards of track had been laid by the Southern family in their spare time. John Southern is the first to acknowledge the great help and encouragement he received from his sons and his wife, Barbara, who, he says, loves the Railway as much as he does. The beautiful 'Duchess' was built by the late Harry Powell of Crewe, and is a magnificent example of the model engineer's craft. 'Western Warrior' was constructed by David Curwen of Devizes and is powered by a 1939 Fiat 500 petrol engine. From the same builder, but with a Morris 100 engine, came the yellow and black English-Electric locomotive, which completes the present locomotive stud.

Future prospects include the purchase of a mammoth 2-8-2 Rio-Grande engine, now two-thirds complete. Promised for later this summer, she will be 13 ft. 6 in. long and capable of hauling up to 100 adults! When Harry Powell died suddenly in 1969, he was building 'Tintern Abbey', a Great Western 4-6-0 'Castle'. The Forest Railway hopes to have this locomotive running in steam before the end of the year. Also due for completion in September is another Great Western engine, a 2-8-0 workhorse of the 47XX class. Enthusiasts need not be surprised at the predominance of Great Western locomotives, for Mr. Southern is a member of the Great Western Society and in his engine shed hangs a nameplate from the original 'Tintern Abbey'. Although two tracks pass through the station, the system is really a complicated continuous-running layout. Two tunnels pierce embankments and there are realistic gradients and cuttings to enliven the scenery. The "forest" of 3,500 trees has been planted and is expected to be scenically adequate in about three years time. Passengers join their train at a modern station, complete with toilet facilities and a refreshment room. The fully-automatic four-aspect colour-light signalling ensures safety, even if railway lovers sigh for the sight of a working semaphore to keep the 'Duchess' company. Plans are in hand to build a footbridge from the platform to a path through the forest, which will lead the visitors to points from which the trains can best be seen.



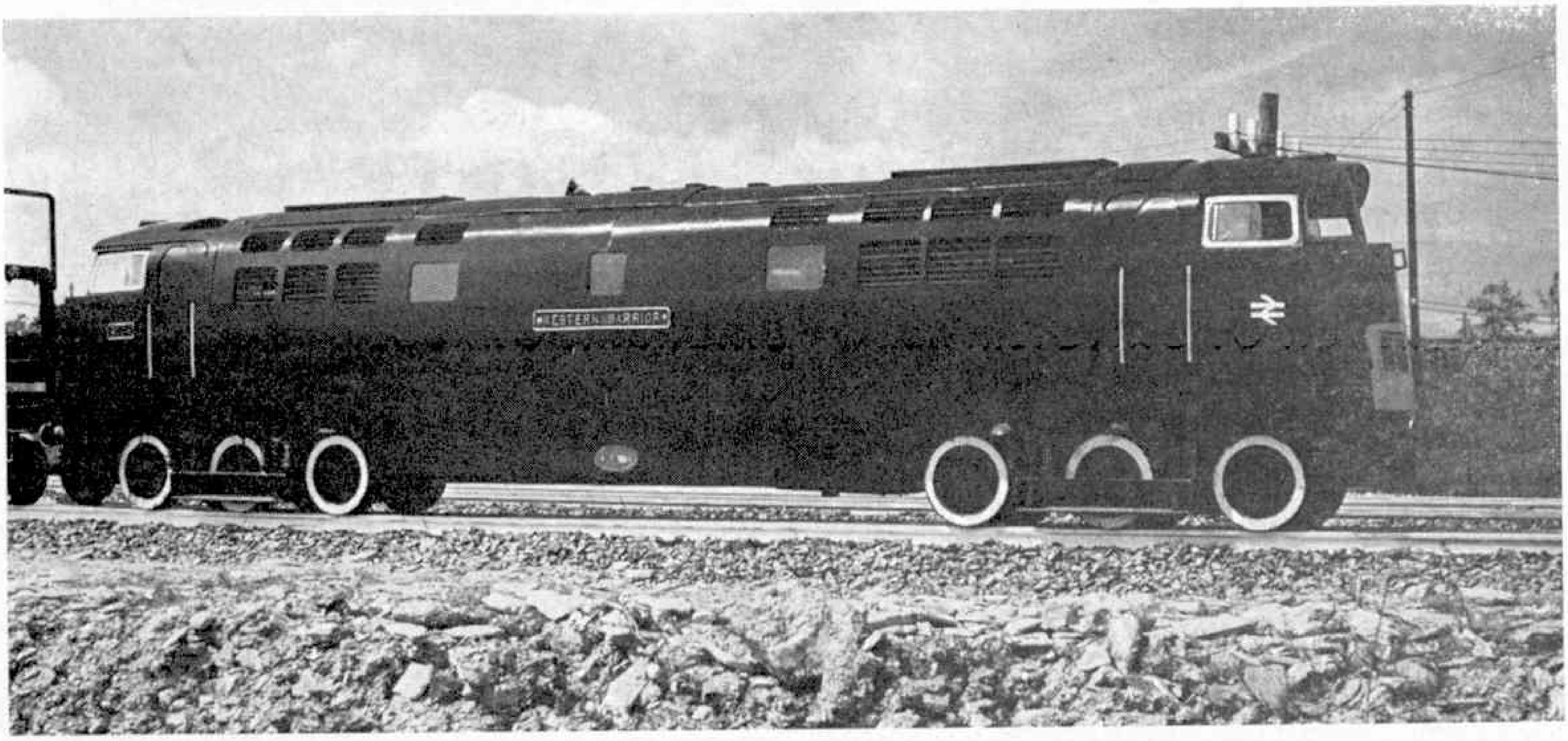
Tunnel portal, showing rear of 4-aspect colour signal and young forest.

The railway on its 3-acre site has obviously cost a lot of money to prepare for fare-paying passengers. The charges are, in fact, extremely reasonable. Admission to view the Railway costs adults 2/- with an additional 2/- fare per rail journey. Children are charged at half-price. Until the end of September, the Forest Railway is open every day from 2 p.m. until 9 p.m. During the Winter Season, the Railway will operate only on the first Sunday in each month from 2 p.m. until 5 p.m. Passengers are accompanied throughout their journey by Meg, who looks on every trip as a race between dog-power and the Iron Horse!

Where is Dobwalls? It lies on the A38 a couple of miles to the west of Liskeard. As you enter the village, turn off to the north along a lane sign-posted to St. Cleer. The Forest Railway car park is on the right-hand side of this road.

But the enthusiast will not need these directions. His ears will follow the exhaust beat and his nose will soon pick up the scent of smoke from Best Steam Coal, mingling with hot oil and paraffin; the nostalgic smell of all steam railways.

'Western Warrior'—powered by a 31-year-old petrol engine.



by dropping 110 volts or more through a household carbon filament lamp and a rheostat or variable resistor, the whole arrangement bordering on the semi-lethal! With the widespread change-over to domestic A.C. supplies, Meccano Ltd. produced an excellent range of transformers so that their popular 6 volt universal motors could be run either from a 6 volt accumulator for those enthusiasts living in houses without mains electricity, or from the mains where an A.C. installation was provided.

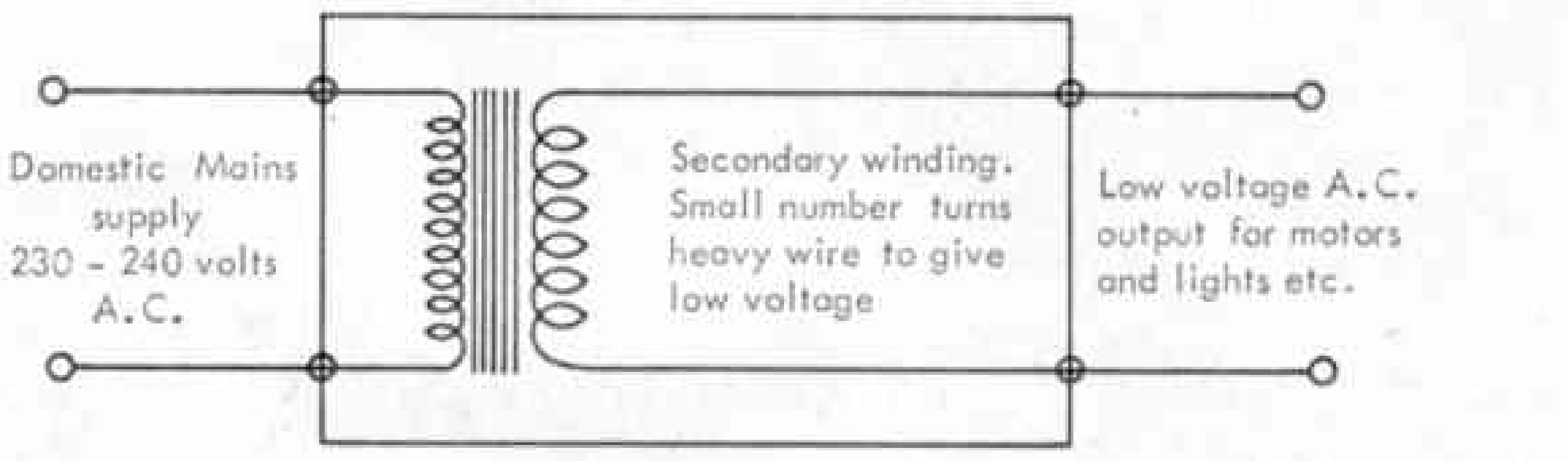
One puzzling feature of operating the A.C. motor is that changing round the transformer leads to the motor has no effect on its direction of rotation. On the other hand, a D.C. motor will immediately reverse if the battery leads are reversed. The explanation is as follows. In the case of the D.C. motor with a permanent magnet field, a change of direction of current through its armature will cause a change of magnetic polarity. Since the field cannot change, being a permanent magnet, the armature will turn in the opposite direction on having its current reversed. In the case of the 'universal' motor, reversing the battery leads or transformer leads simply reverses the magnetic polarity in both the armature and the field and we are back to square one, still going in the same direction.

In order to reverse a universal motor (A.C./D.C.) we must maintain the winding sense in the field coils but change over the polarity to the armature only, or vice versa. In the case of the current Meccano universal motor, the E15R (Electric, 15 volt, Reversing), one terminal is wired directly to the field coil and the other to a change-over switch. Current flow may then be considered to be through the field coil and then through the armature, the armature being reversible by means of the change-over switch to put it into opposite 'phase' to that of the filed coils and hence cause reverse of motion. The arrangement of wiring described is known as 'series' winding which means that the field and armature are in series, like two fairy lights on a string of tree lights at Christmas, which means that the current is the same in both parts of the motor from the D.C. point of view, and they 'share' the total voltage, commonly 6, 15 or 20 volts in the general range of Meccano electric motors. They do not necessarily have exactly half the voltage in each part of the motor, A.C. circuit theory not being quite so straightforward where electrical quantities, combining resistance and inductance, are involved.

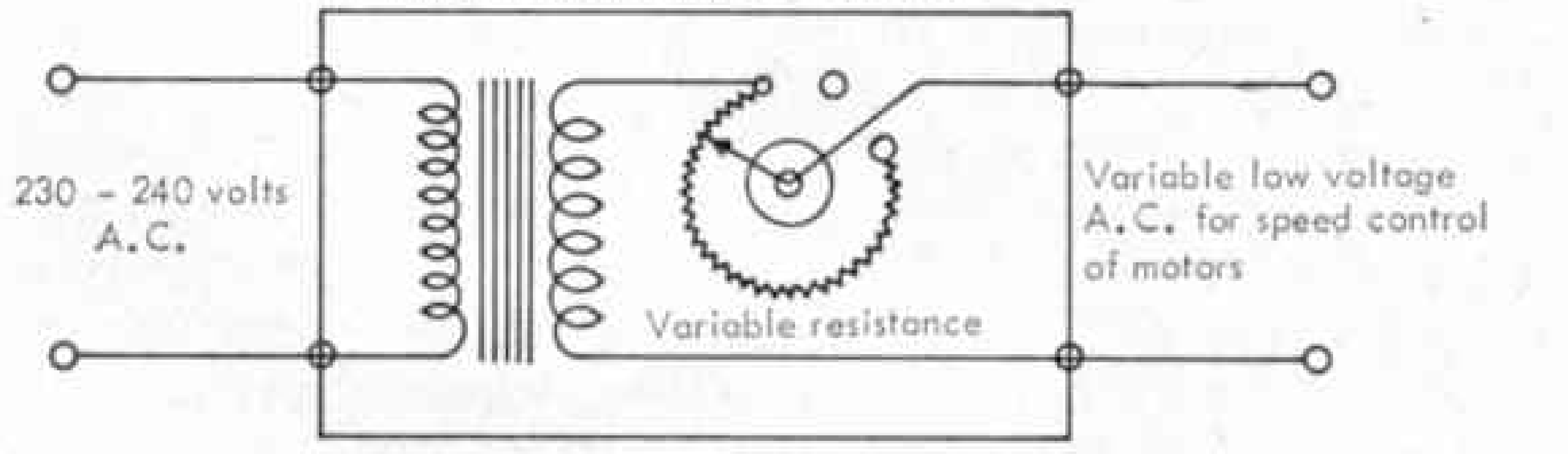
Fig. 2 shows the general arrangement of the Meccano universal motors, a non-reversing type being illustrated. This demonstrates the series winding, direction of flow round the windings being illustrated for a D.C. input of appropriate polarity. Fig. 2(b) shows the switching arrangements built into the reversing motors manufactured by Meccano Ltd. over the past 50 years or more. This arrangement also highlights a disadvantage of the universal motor. In order to reverse its direction it is necessary to operate a mechanical reversing switch on the site of the motor so that it is not directly suitable for remote control. Long mechanical linkages could be fitted but this would be clumsy and seldom satisfactory. A D.C. motor, such as the Power Drive Unit with 6 speed Gearbox, the Junior Power Drive or the now-discontinued Emebo motor can readily be controlled remotely simply by fitting long leads to the battery or power unit and reversing the leads at the source of power by a simple change-over switch. However, there is a way of controlling the E15R motor and similar universal motors, remotely, by using four leads to a remote change-over switch, but this requires direct wiring to the motor terminal block after removing the fitted reversing lever and modifying the internal connections. Advanced modellers and those well acquainted with motor wiring may tackle such a modification, details of which are shown in Fig. 3.

Lead 1 goes straight to the motor terminal which is already connected to the field coil. The other field connection is made to the second motor terminal, internal modification being carried out as required. Finally, the brush leads in the motor are connected to the top two studs of the switch block after removing the reverse lever. The remote switch requires terminals and contacts as shown in Fig. 3 and a simple switch of this kind can be made from electrical parts in the Meccano system. Failing this, a radio-type switch, known as a D.P.D.T. (double-pole, double-throw switch) will do the trick.

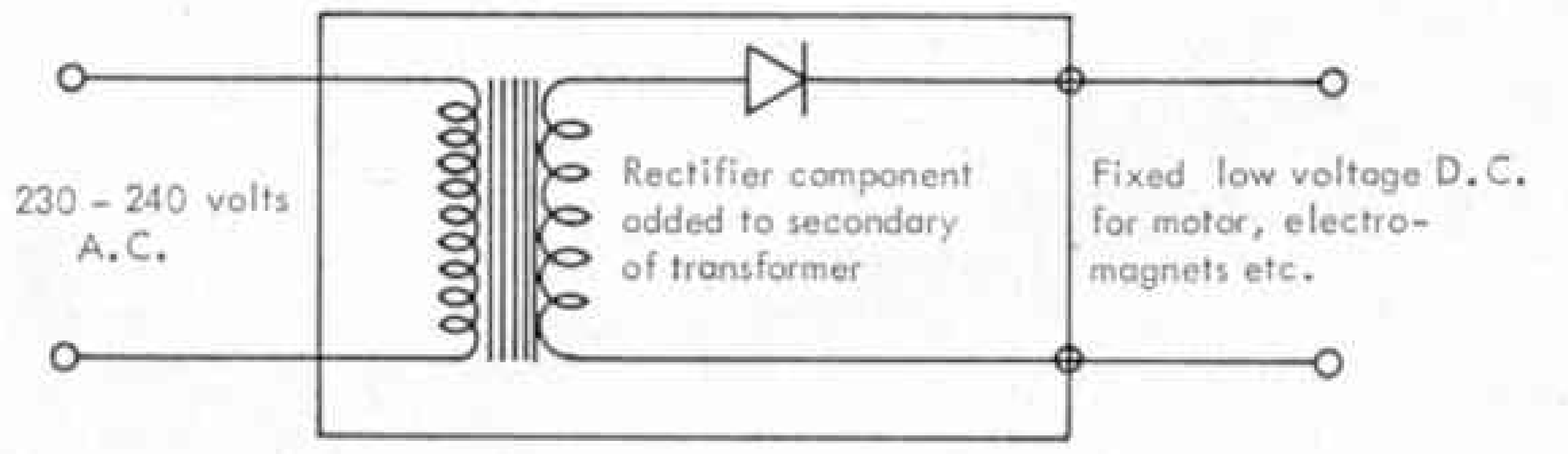
(a) Simple Transformer



(b) Transformer with speed controller



(c) Simple D.C. supply unit



(d) D.C. supply unit with speed controller

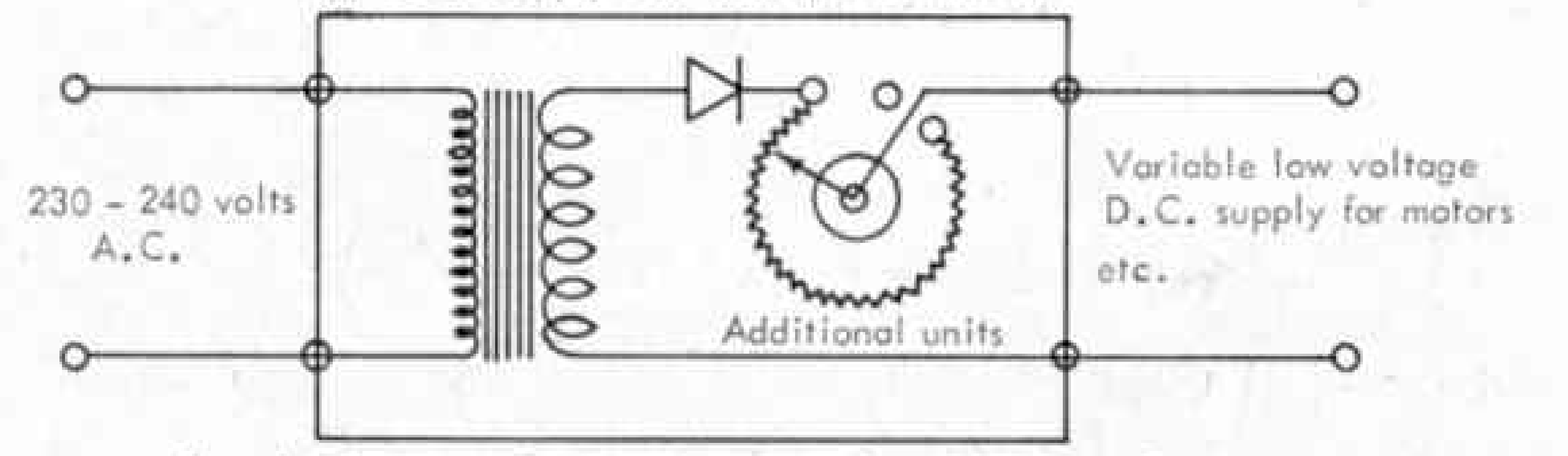


Fig. 4 Diagrammatic representation of popular forms of transformers and controllers.

Fig. 3(a) shows how the remote leads can be reduced from a four-core cable to a three-core system by making use of the chassis of the model, such as one would find in a large crane etc., and 'earthing' lead 1 to the model and one side of the power supply. The modern zinc finish on Meccano parts is an excellent conductor of electricity and, if contacts are made to parts with such a finish, no difficulty should be encountered in making a good return circuit.

With regard to power supplies for the various motors, while a 6 volt or 12 volt dry battery is quite suitable for the modern Meccano D.C. Power Drive motors, the majority of constructors will make use of mains supplies suitably reduced by means of transformers etc. A look at Fig. 4 will show the four basic types, in simplified form, which the Meccano builder is likely to come in contact with. Generally speaking, the

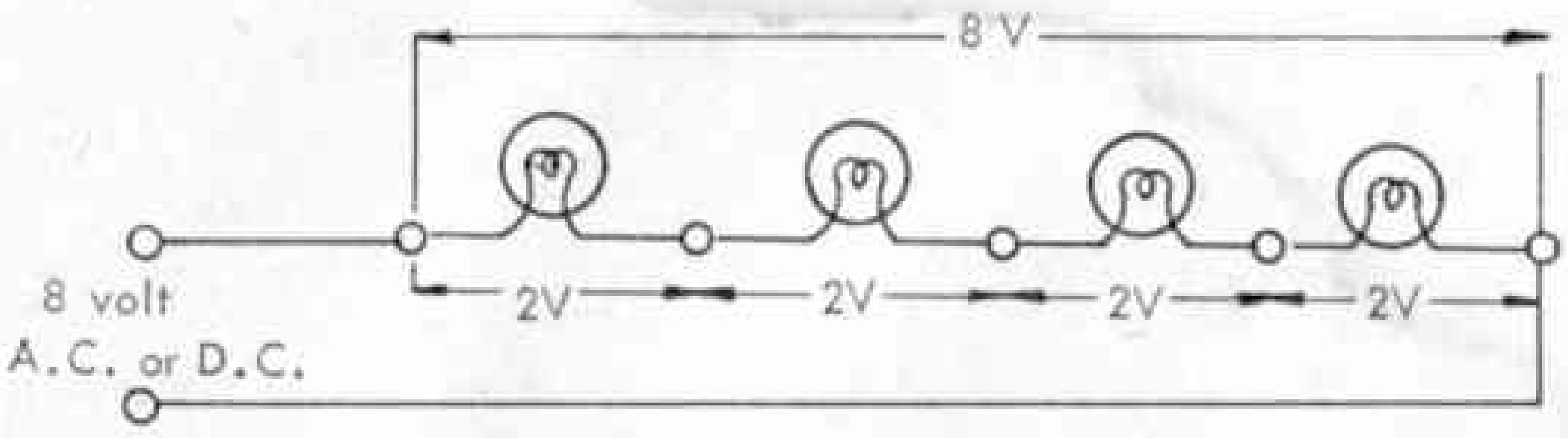


Fig. 5(a) A simple series circuit in which four 2 volt lamps are lit by a supply of 8 volts A.C. or D.C. Removal of one lamp will extinguish all lights.

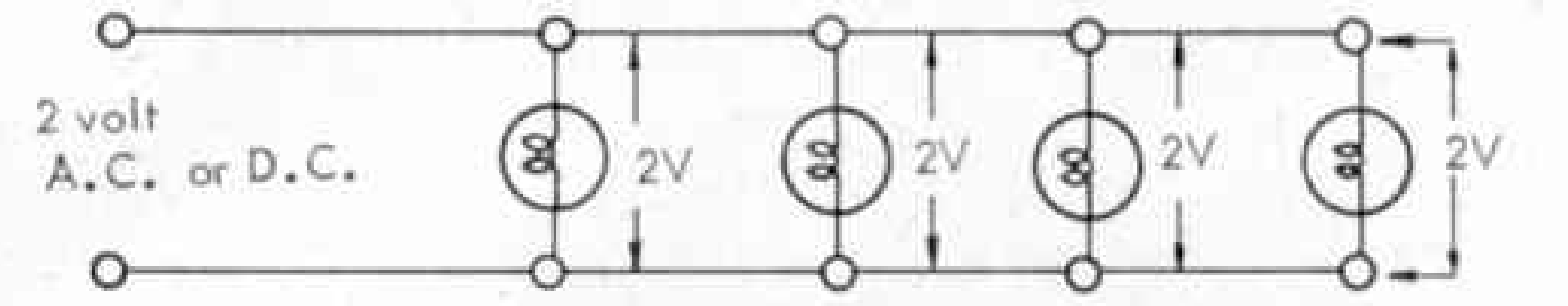


Fig. 5 (b) A simple parallel circuit in which four 2 volt lamps are lit by a supply of 2 volts A.C. or D.C. Removing any lamp will not extinguish the others.

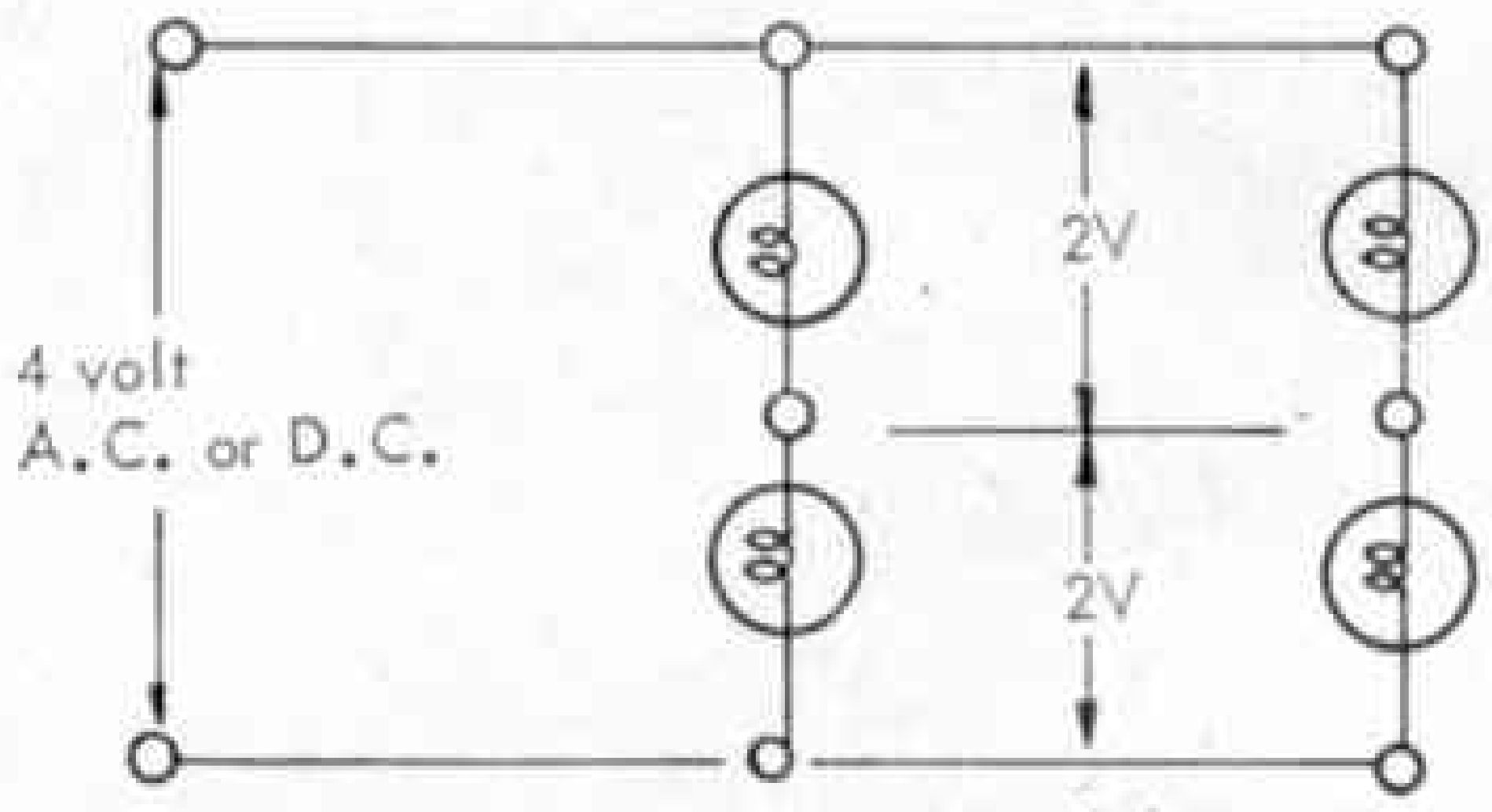


Fig. 5(c) Combined series/parallel circuit in which four 2 volt lamps are lit from a 4 volt A.C. or D.C. supply. Removal of one lamp will not extinguish the other two left in series across the 4 volt supply.

universal motors run at their best on full voltage, speed reduction being obtained by appropriate gearing. A simple transformer is required in this case, see Fig. 4(a). Essentially, a coil of many hundreds of turns of wire is wound round a metal core of soft iron and then, after layers of insulation are added, a second coil of wire, in thicker gauge, with a small number of turns is wound over the first. The long coil is known as the 'primary' and this receives the full 230 or 240 volts from the house mains. The smaller coil of thicker wire is called the 'secondary' and this provides the reduced voltage to the universal motor. Some transformers are fitted with speed controllers as shown in Fig. 4(b), the controller in this case being a variable resistance connected in the secondary circuit. Such a transformer is commonly used for operating 6 volt or 20 volt A.C. trains but its speed regulation properties are not particularly good.

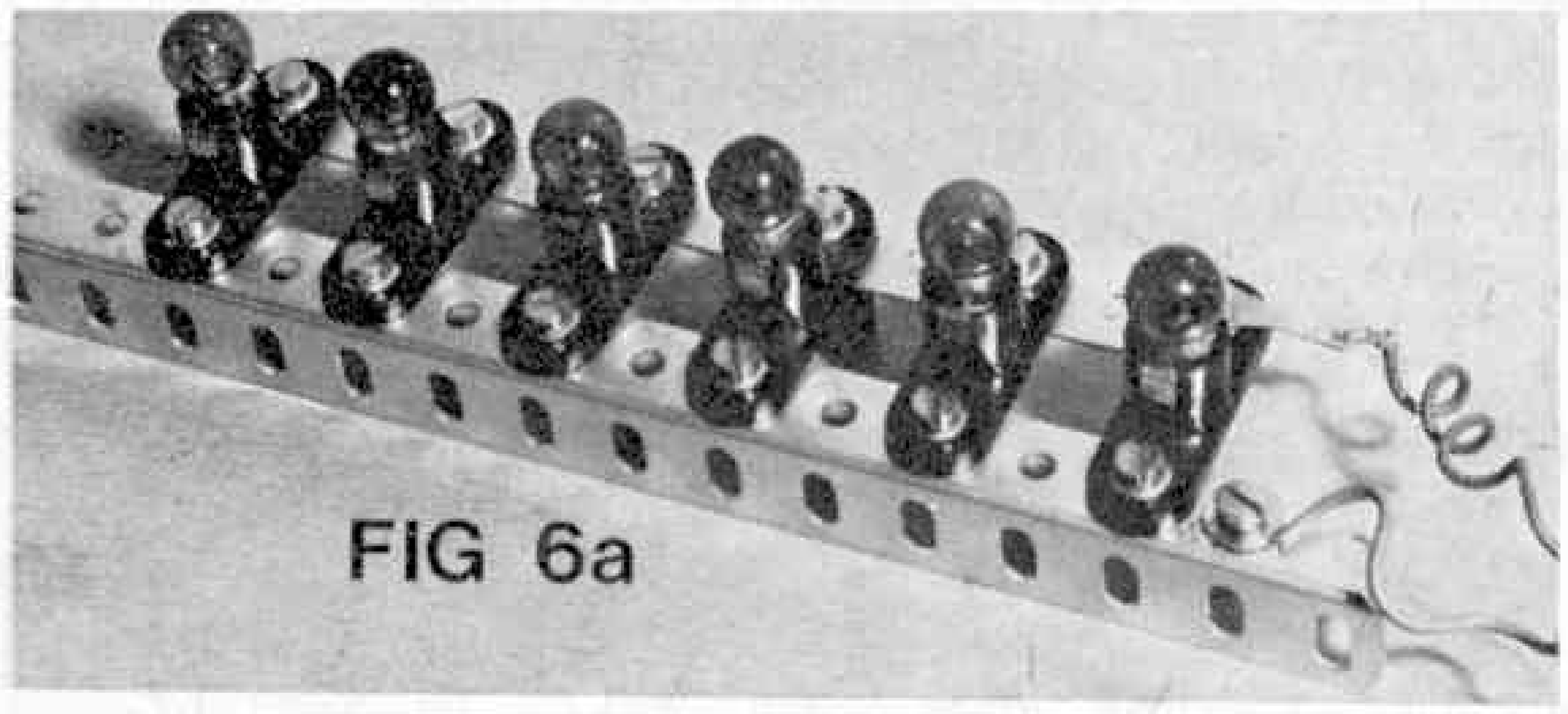


FIG 6a

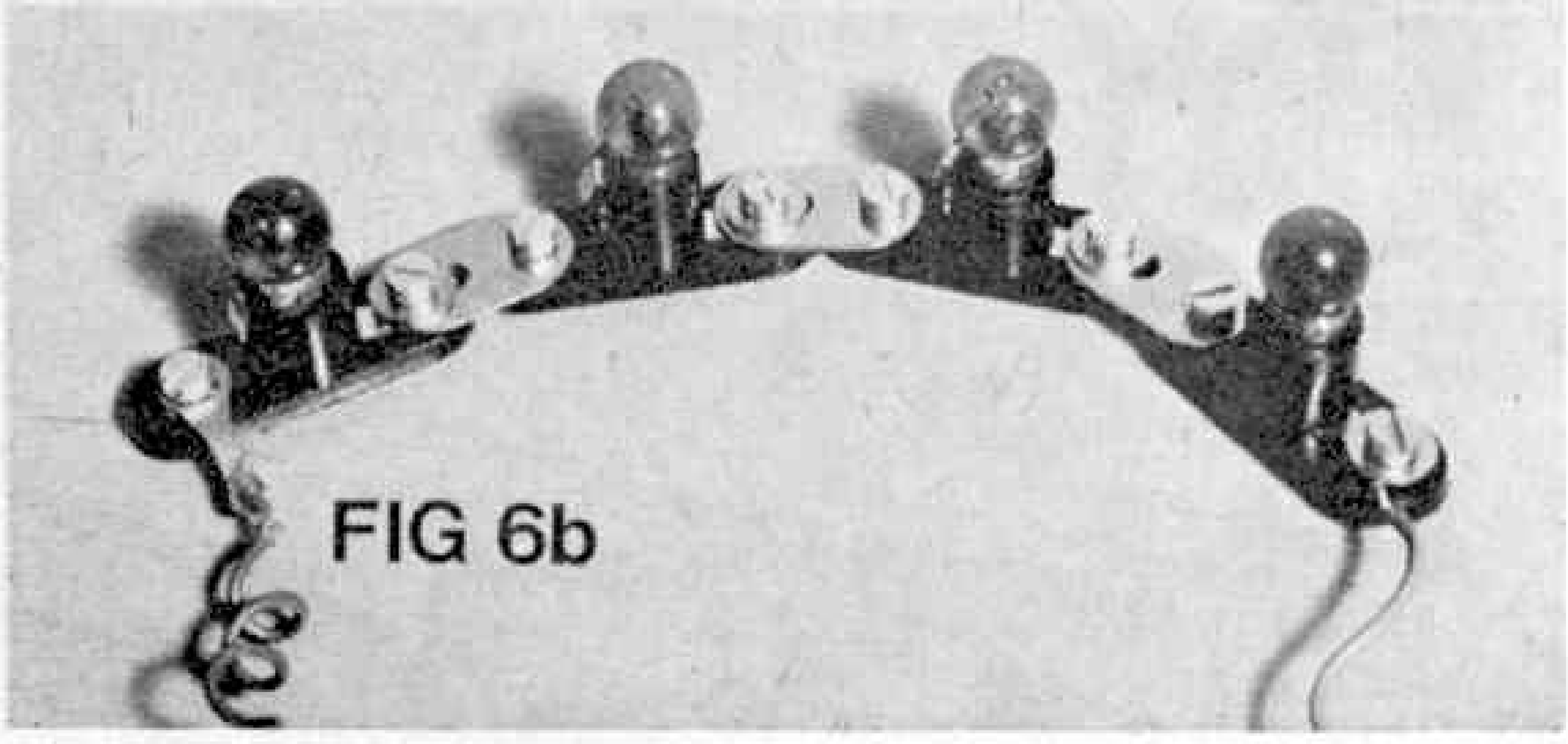


FIG 6b

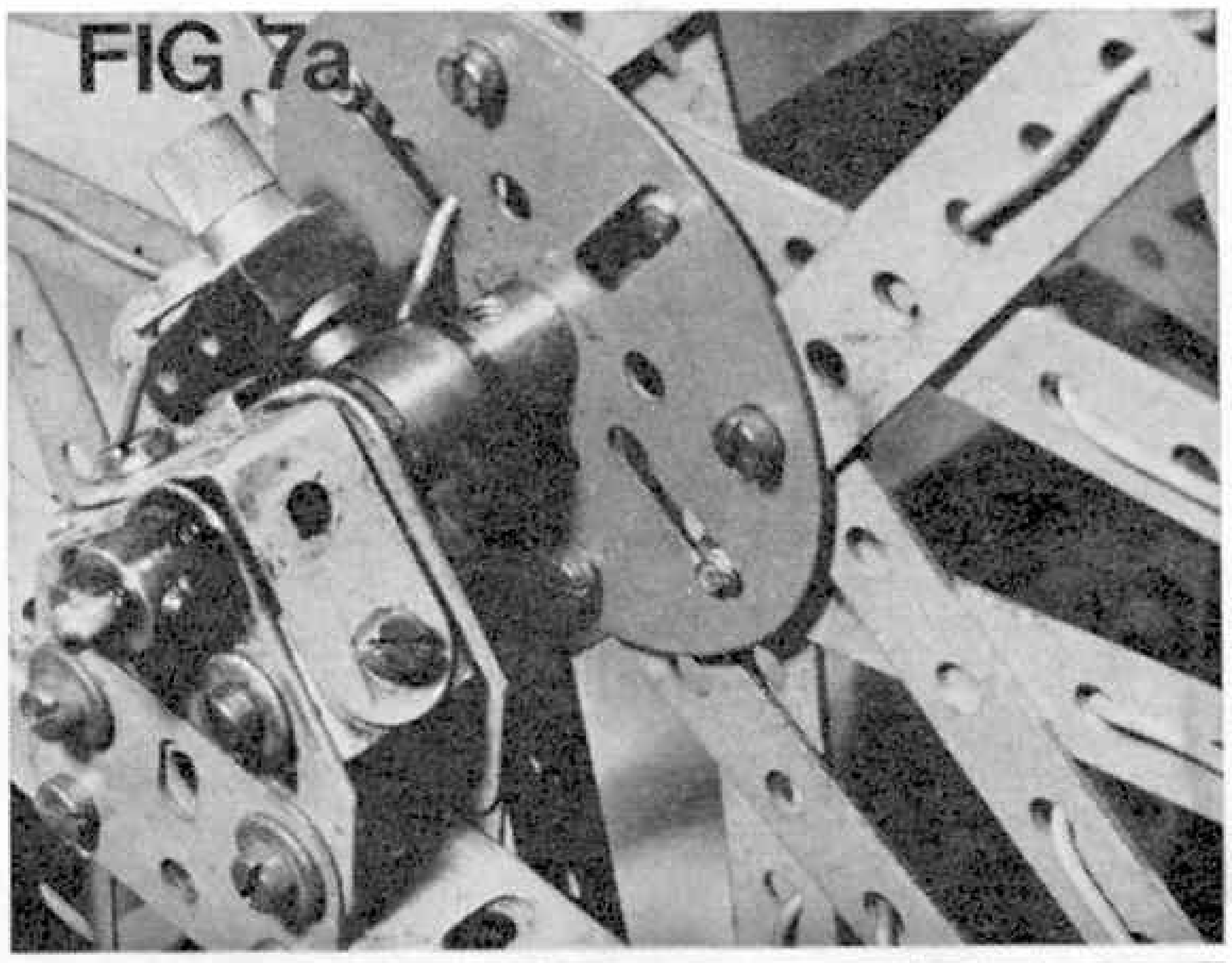


FIG 7a

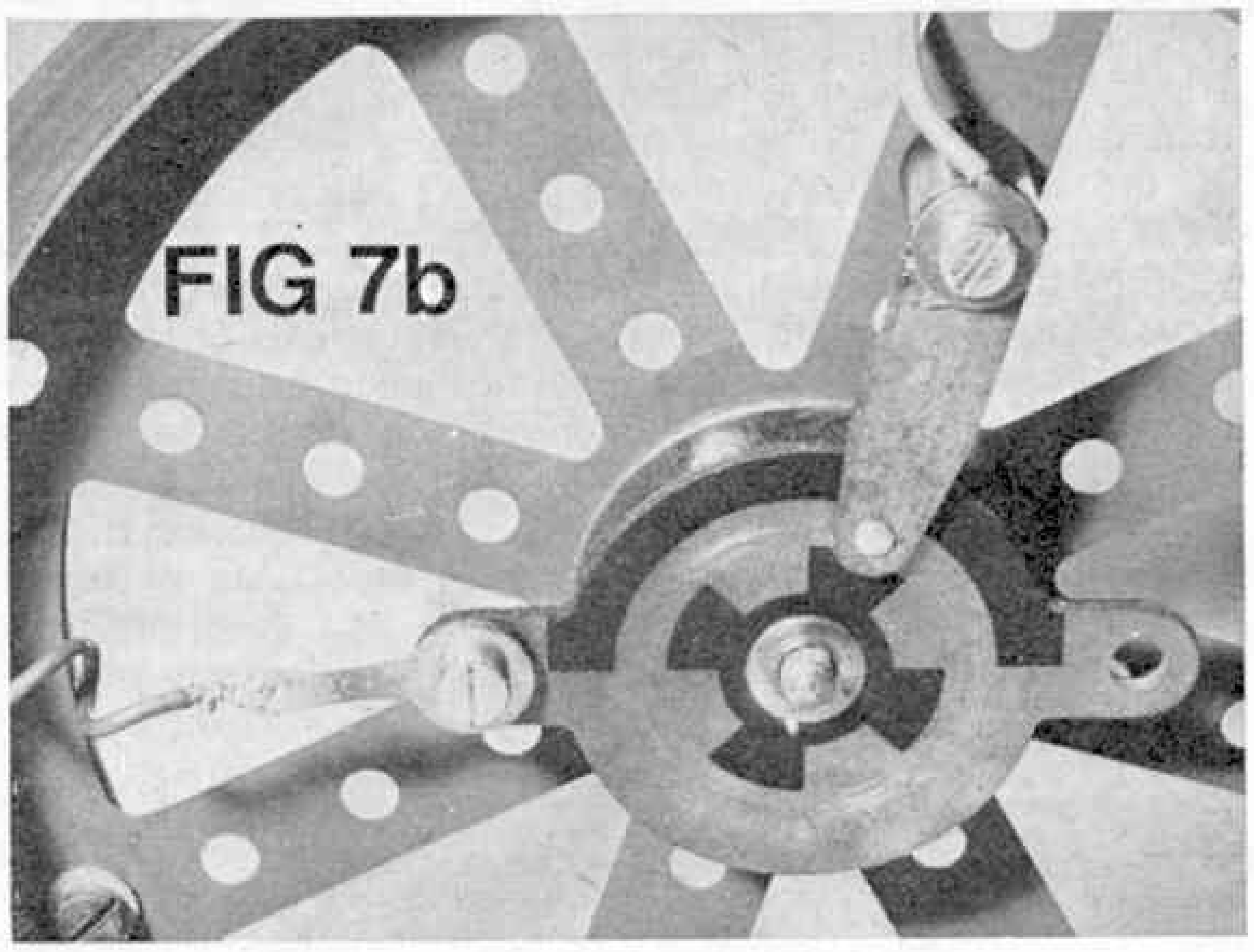


FIG 7b

If D.C. apparatus is to be powered, an additional item is required in the secondary side of the transformer to permit the A.C. current to flow in one direction only, thus converting it to D.C. This item is called a 'rectifier' and is shown diagrammatically in Fig. 4(c). When combined with a variable resistance, Fig. 4(d), the unit becomes a D.C. controller and is popularly used with small-gauge railways etc., because of its simple reversing qualities. The last refinement of the D.C. controller is to incorporate a change-over switch with the variable resistance, thus allowing motors, locomotives, etc., to be reversed from the controller.

Although the modern Meccano D.C. Power Drive motors are adequately powered by dry batteries, they may also be powered by mains-operated D.C. control units such as are used for model railways. A word of warning is required here, however. As the two Power Drive motors are primarily designed for battery operation they are not suppressed against radio and T.V. interference. If they are used with mains-driven controllers, they become highly effective (and illegal) interference transmitters! Suppressor circuits can be added and advice from a local radio dealer could be helpful in this respect.

Apart from motion, nothing adds more to the realism of a model, whether working or static, than a good display of coloured lights. Thanks to Meccano Electrical Parts, the modeller can decorate his structures to great effect. Three basic forms of circuit wiring are available to the constructor and these are illustrated in Fig. 5. The first is series wiring, all lamps strung out like fairy lights, current passing through each lamp in turn. This arrangement would be suitable for a string of six 2 volt lamps if a 12 volt transformer was used, as the voltages of the lamps, in series, are added for the total.

The second arrangement is a straightforward parallel circuit in which the lampholders are arranged like the rungs of a ladder and each lamp receives the full voltage of the supply available. The coloured lamps supplied by Meccano are for 12 volt working but each lamp draws only .04 amps. This means that no less than 100 Meccano 12 volt lamps could be illuminated by a 12 volt transformer rated at 4 amps. 'Popular' 12 volt transformers have a current rating of 1-2 amps so that 25 to 50 lamps could be driven from such transformers. The Electrical Part Lamp Holder has an all-insulated casing, but its securing holes are also contact bushes for wiring. A number of such Lamp Holders can be virtually built up like a ladder as shown in Fig. 6, no wiring being required between Holders as all current is carried by the Perforated Strips. Standard Bolts, (3/8 in. preferred) fit the holes but there must always be a gap in the metal contacting the two holes of any one Lamp Holder, as the brass bushes in the Lamp Holders are not insulated. They can, of course, be mounted on any part of the surface of the Fibre Insulated Plates, the simple rule being to make sure that there is no metal connection across the two holes of the holder as this would give a short circuit, no light and possibly a burnt-out transformer.

Very little wiring is required with the Lamp Holders, thanks to the versatility of the Electrical Parts, and Fishplates or frameworks provide neat and adequate current paths as shown in Fig. 6(a). It must always be borne in mind that low-voltage supplies are to be used with these parts. In theory, 20 Lamp Holders fitted with Meccano 12 volt Lamps could be strung in series across 240 volt house mains, but, in this case, all bare screws and tags on the lamp holders would be a potential lethal danger!

FIG 9

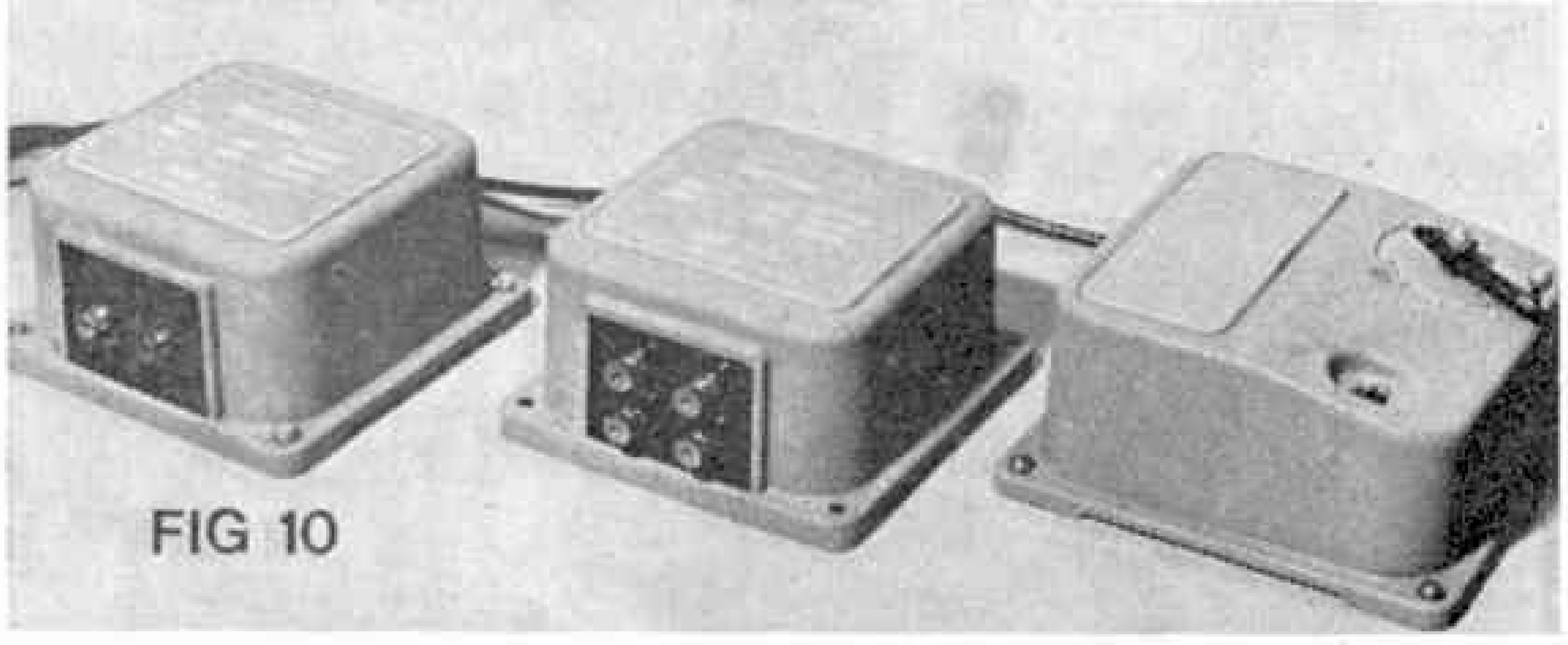


FIG 10

Finally, we may add further interest to illuminating models by arranging for lights to rotate with the superstructure of Big Wheels, Roundabouts and similar models. Fig. 7(a) shows how current is passed from the 'A' frames of a Ferris Wheel to the wheel itself by means of a carbon brush holder attached to the 'A' frame which contacts a simple copper ring commutator mounted on, but insulated from, the main spindle. The Electrical Part Flat Commutator is shown in Fig. 7(b) with a short Wiper Arm located to wipe on its surface. This Commutator has three tracks which give 180°, 360° and four equally-spaced intervals of 45°, respectively, and it may be used for intermittent contact as required.

As well as supplying current for lights to rotating structures, the Commutator will also carry the current required for any of the Meccano Electric Motors. Wiring should be carried out in plastic insulated cable, trimmed carefully to retain all strands, connections being made securely below a Washer or by means of a soldered tag where the constructor has facilities for soldering. Bare metal-to-metal contacts must be maintained and, if the framework of a model is employed for the 'earth' return path, it will serve both for A.C. and D.C. circuits, as shown in Fig. 8.

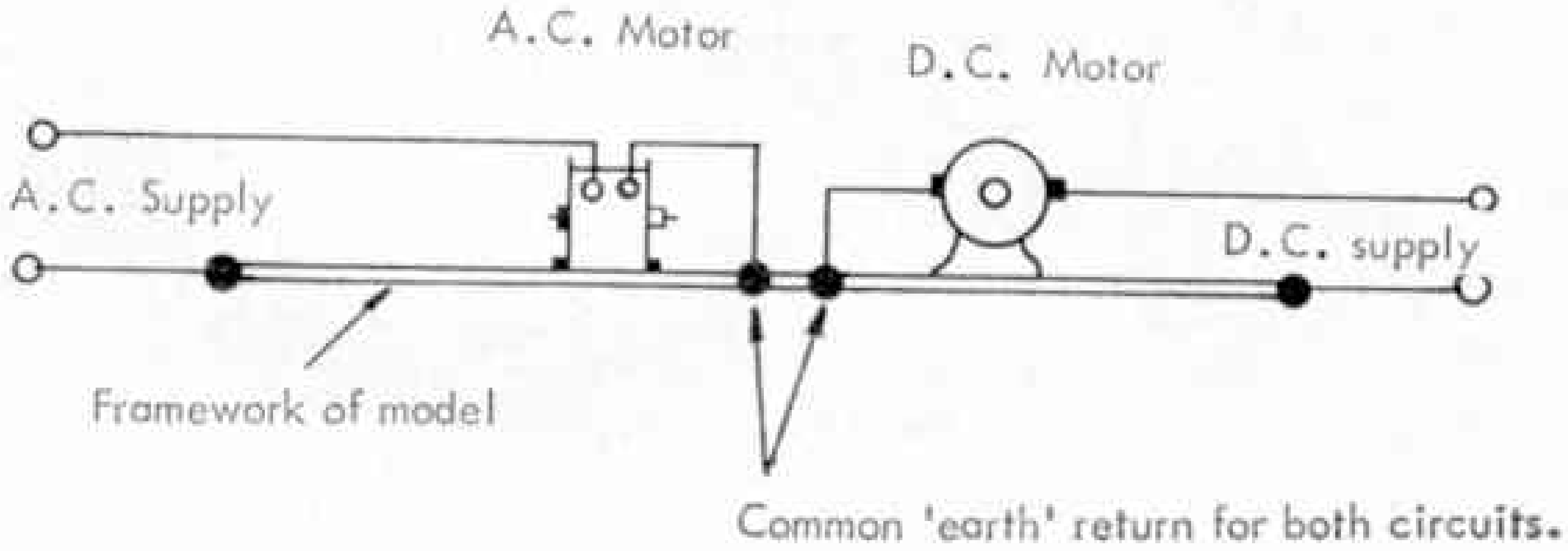


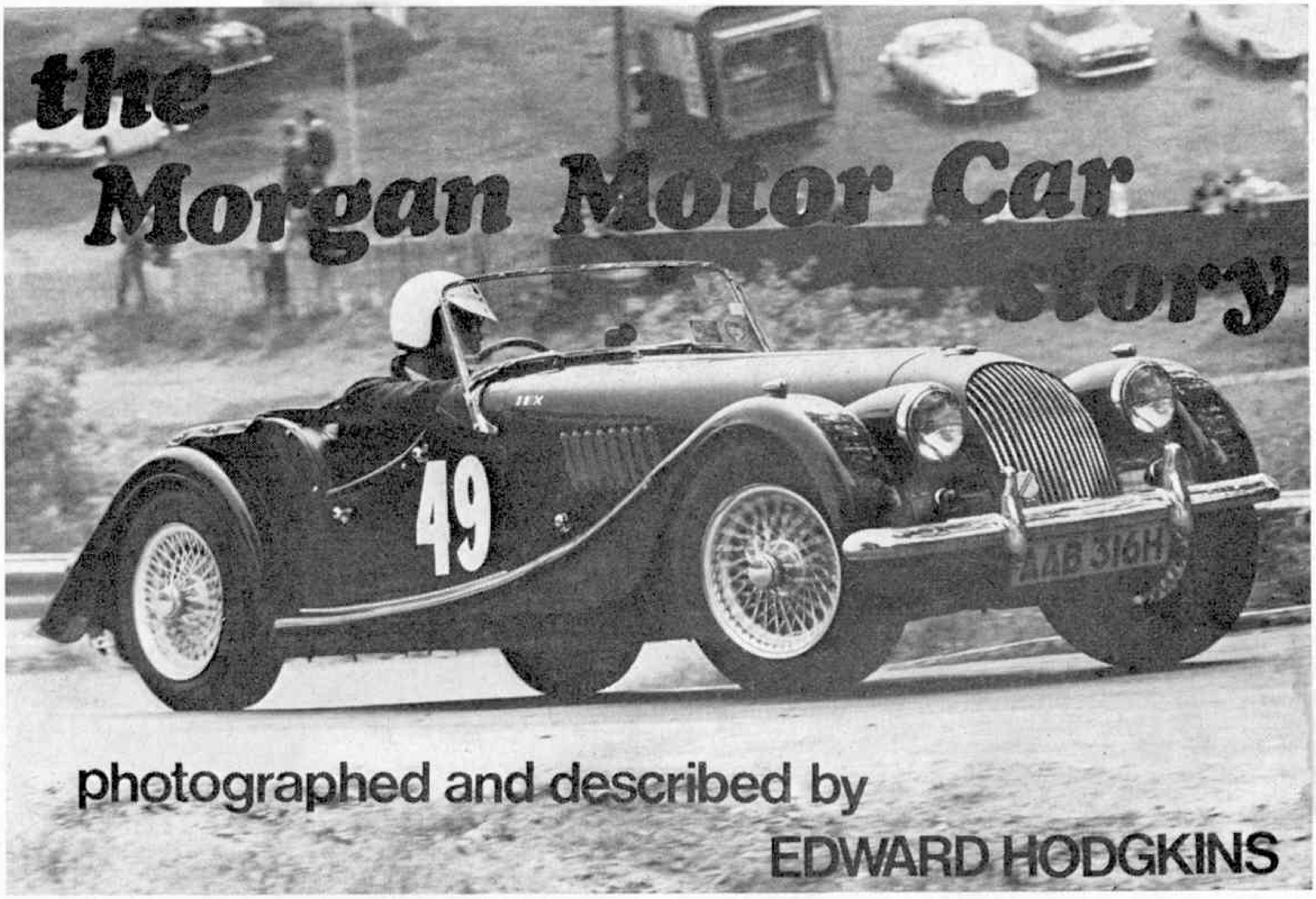
Fig. 8 If the chassis of a model is used for the return path wiring for motor or lights a common earth point may be used for both circuits as shown above, despite the apparent 'mixture' of A.C. and D.C. supply. The motors may still be reversed by their reversing levers but separate earth leads will be needed if multiple remote control is required.

**As this is the closing chapter of the series, the writer would like to thank all those enthusiasts who have written so many encouraging letters to him during the course of the publication of the Constructors' Guide.**

**In particular he would like to thank those members of the Midlands Meccano Guild who have provided some of the material used in the various chapters and for their permission to take photographs in certain cases.**

**Because of the world wide interest shown, the Guild is now preparing an International Register of Meccano Constructors (over 18 years old). Any enthusiast actively engaged in model building in Meccano is invited to apply for entry on to the Register. This may be done by sending a stamped addressed envelope (International Reply Coupon for overseas constructors) to B. N. LOVE, Hon. Sec. Midlands Meccano Guild, 61, Southam Road, Hall Green, Birmingham, 28.**

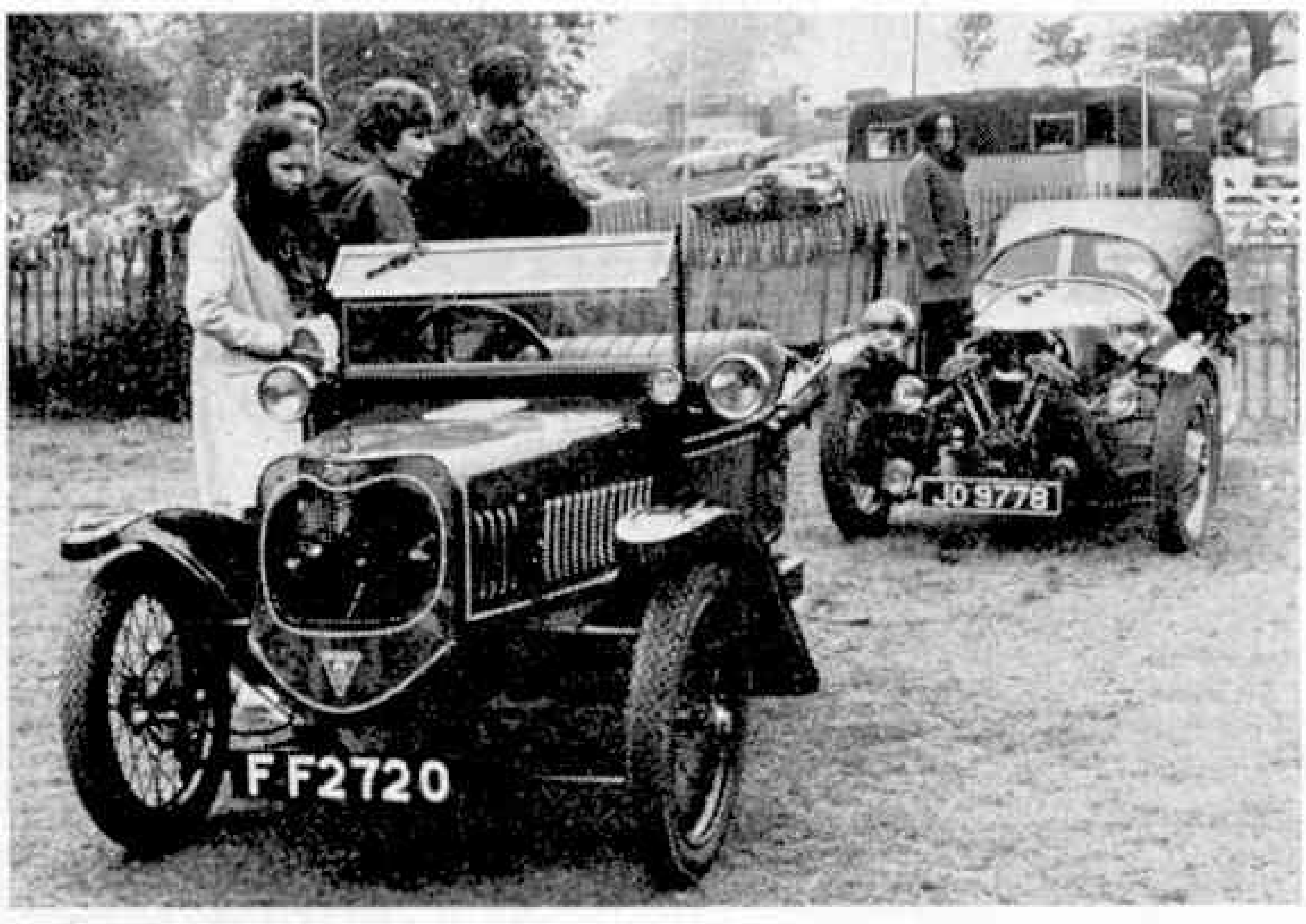
# the Morgan Motor Car story

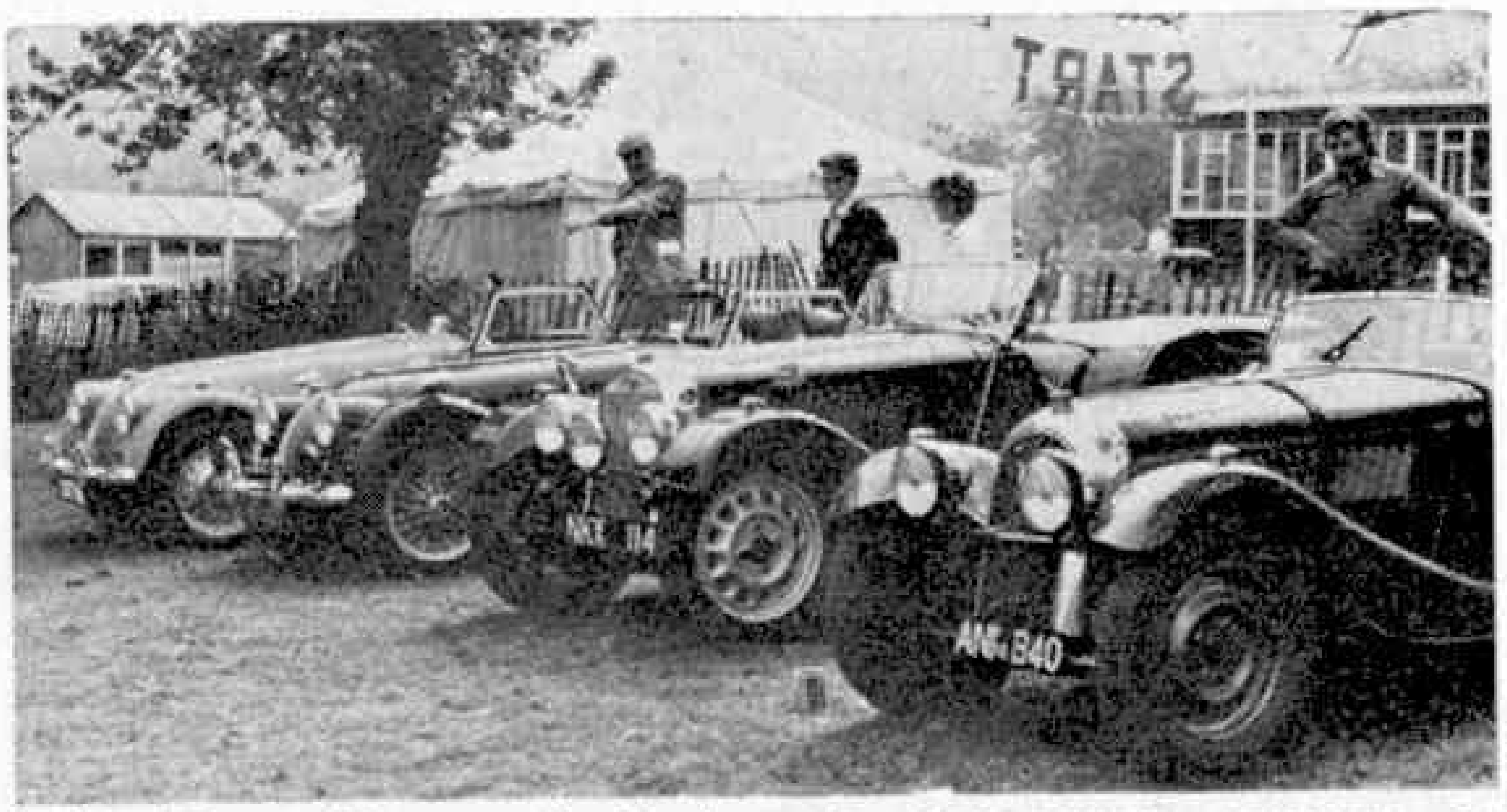


### photographed and described by EDWARD HODGKINS

***This year is the fiftieth anniversary of the Morgan Motor Company, perhaps the most remarkable British motor car producers still in business as a private concern***

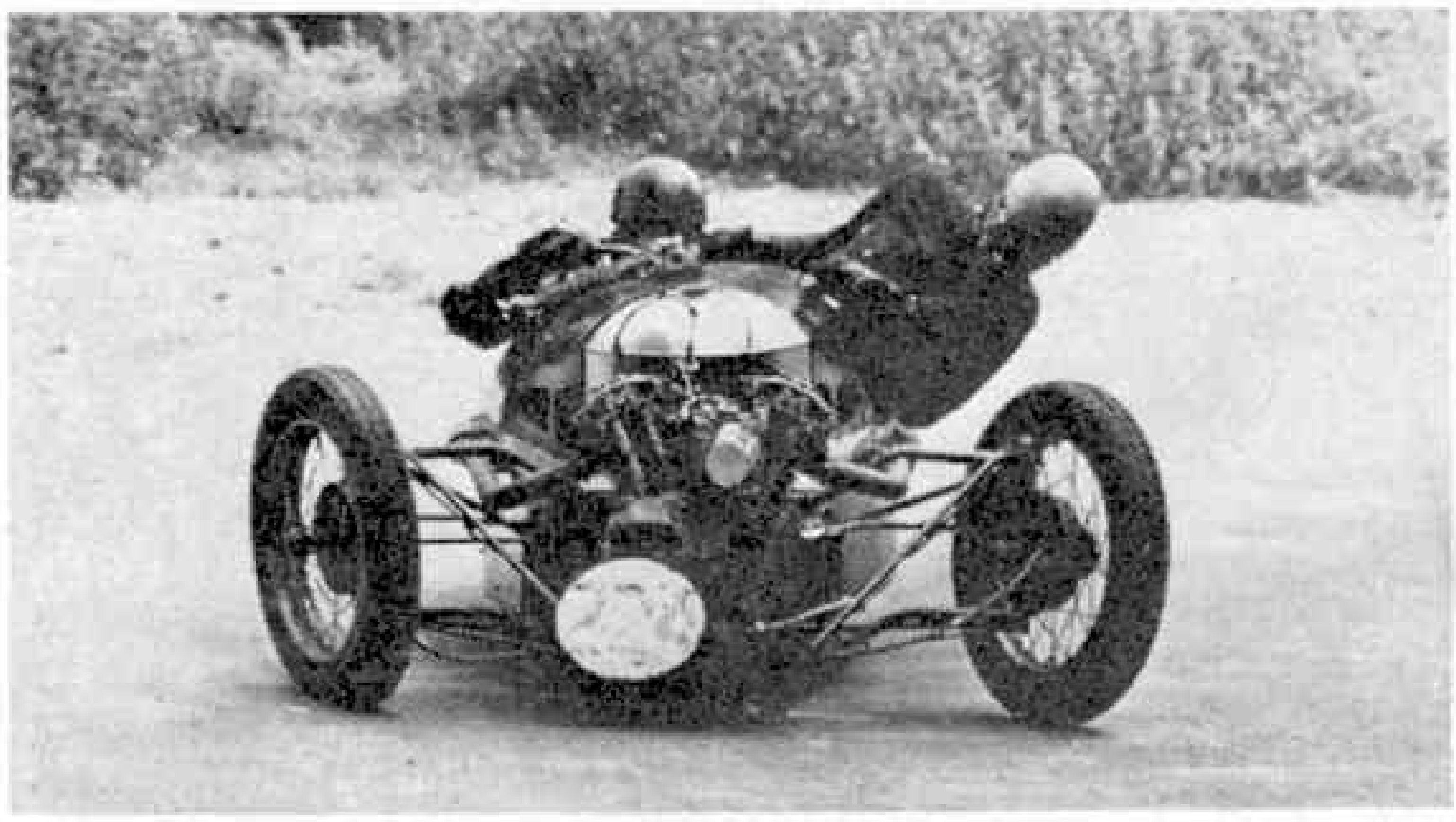
NINETEEN-SEVENTY marks the Diamond Jubilee of one of the few surviving family businesses in the motor industry—The Morgan Motor Company of Pickersleigh Road, Malvern Link. The Morgan story really goes back beyond the formation of the company —to 1881, in fact, when Mr. H. F. S. Morgan was born at Stoke Lacy Rectory in Hereford. " HFS ", as he became widely known, was the son of the late Rev. Prebendary H. G. Morgan, and was educated at Stone House, Broadstairs; Marlborough College and the Crystal Palace Engineering College. At 18, he began his career at the G.W.R. Railway Works in Swindon,





Left: Two Morgan 3-wheelers in the recent concours at Prescott: FF2720 dates from 1928 and JO9778 is a model from the 30's.

Above: Line-up of Morgan 4-wheelers ranging from 1936 to 1970 recently seen at Prescott.

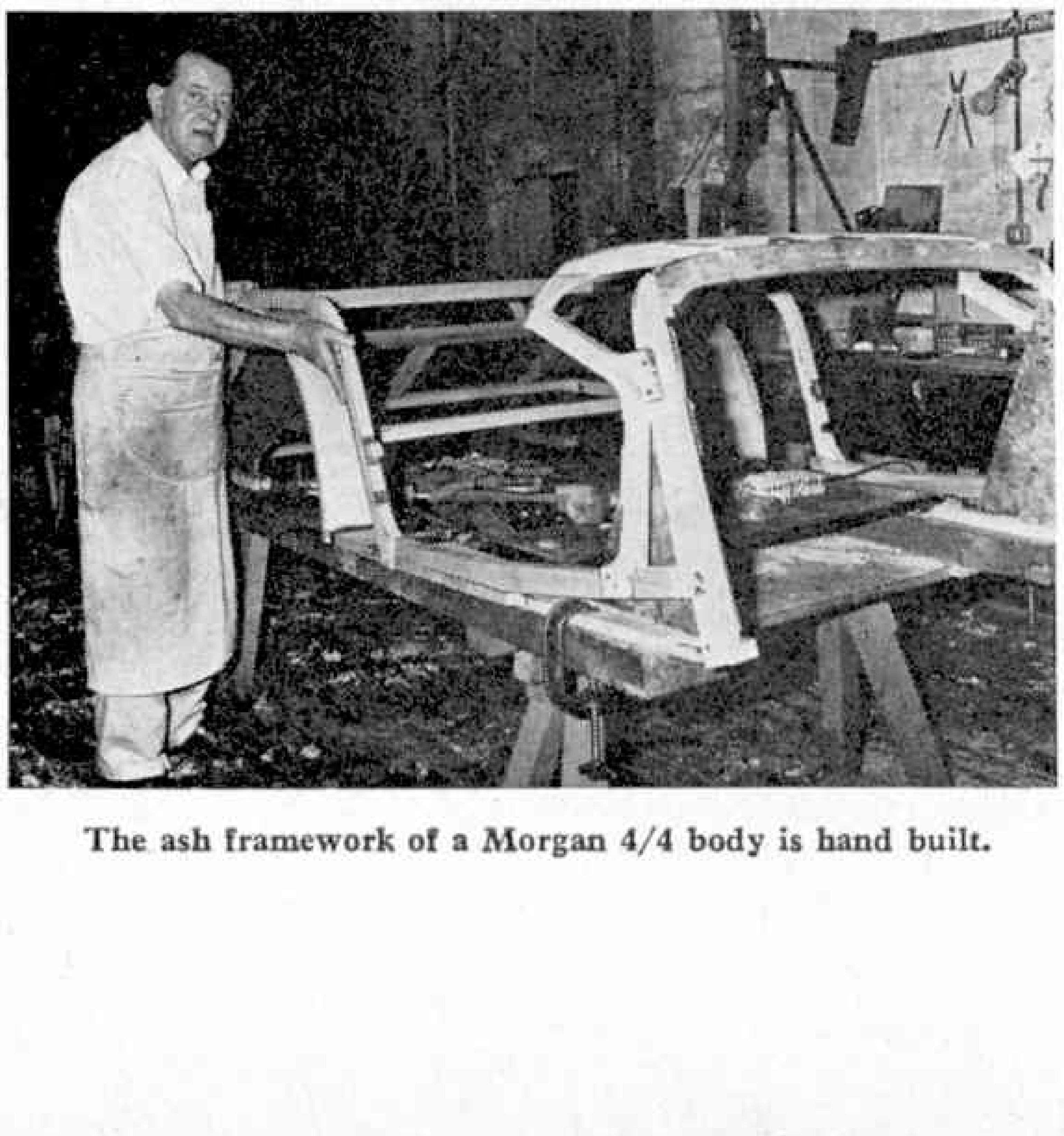


A 1928 Super-Aero Matchless Morgan 3-wheeler in action at a Prescott Hill climb recently.

eventually becoming a draughtsman to spend seven years in the drawing office.

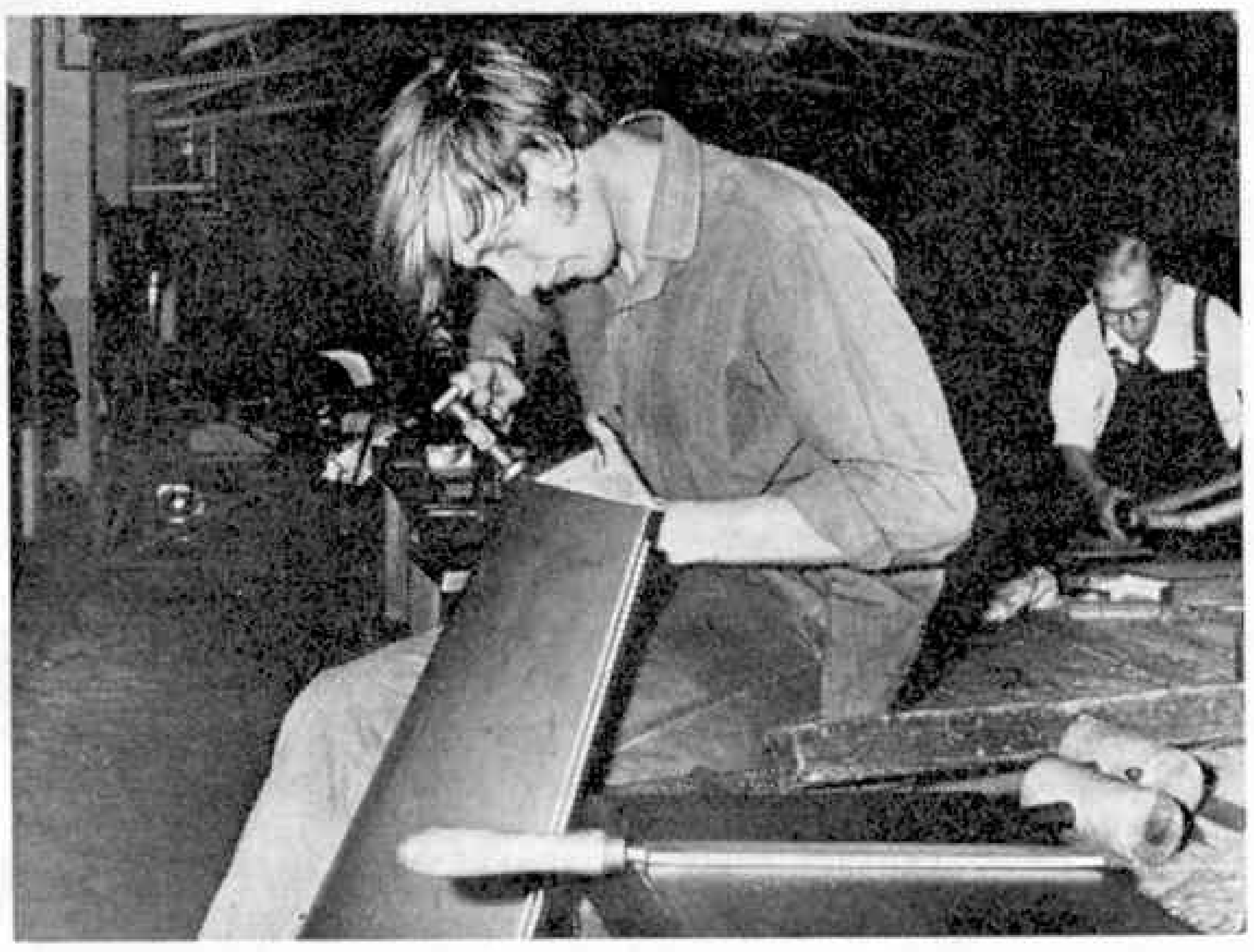
During this time, HFS was developing a love of motor cars and in 1899 he hired a 3½ h.p. Benz cycle-car from a Mr. Marriot, Hereford's first motor trader. This first drive nearly ended in disaster when the car ran away with him down a 1-in-6 gradient, coming to an abrupt stop at the bottom. HFS was unhurt, but his father had to foot a repair bill of £28. Following this ill-fated event, HFS saved hard for three years to purchase his own machine—an Eagle Tandem. This was an 8 h.p. three-wheeler and helped to give its owner the idea of building his own three-wheeler car.

In 1906, at the age of 25, HFS left the G.W.R. and opened a garage and motor works in Malvern Link, where he carried out experimental work and also ran a very successful Bus Service between Malvern Link and Malvern Wells. He was using 10 h.p. Wolseley 15-seaters for this service, and was later to run additional services between Malvern and Gloucester. During this period, he designed a three-wheeled tubular chassis and installed in it a 7 h.p. Twin Peugeot engine that he originally bought for a motor cycle. This experiment was to prove the beginning of forty years of three-wheeler production, but at the time there had been no intention of marketing the vehicle. This model, which was called the Morgan Runabout, received such favourable comment wherever it went that the decision was made to build a few for sale. Hence, in 1910, with capital for machine tools and an extension to the garage provided by his father, HFS started production. With Patent drawings provided by a bright youth by the name of John Black (later to become the famous Sir John Black of the Standard Motor Company) a Patent was granted, and the first Morgans appeared at the Olympia Motor Show in 1910. These were single seaters and created great interest, securing about thirty orders. However, it was clear that the public would prefer two-seaters and these were produced in time for the 1911 Motor Show.



The ash framework of a Morgan 4/4 body is hand built.

Meanwhile, HFS entered his single-seater, three-wheeler in the London-Exeter-London reliability trial, winning the highest possible award—a Gold Medal. The orders poured in and the garage was further equipped and extended with the help of deposits received on orders. In 1912, the Morgan Motor Company was formed as a private Limited Company, with the Rev. H. G. Morgan as Chairman and his son Managing Director. From now on Morgans were to really make their name in Motor Racing circles with many class wins at Brooklands as well as in Reliability and Speed trials. In 1913, a Morgan made the fastest time at the Midland Automobile Club's Shelsley Walsh Hill-climb, near Worcester, with a speed of 22 m.p.h. (The record today stands at more than 60 m.p.h.).



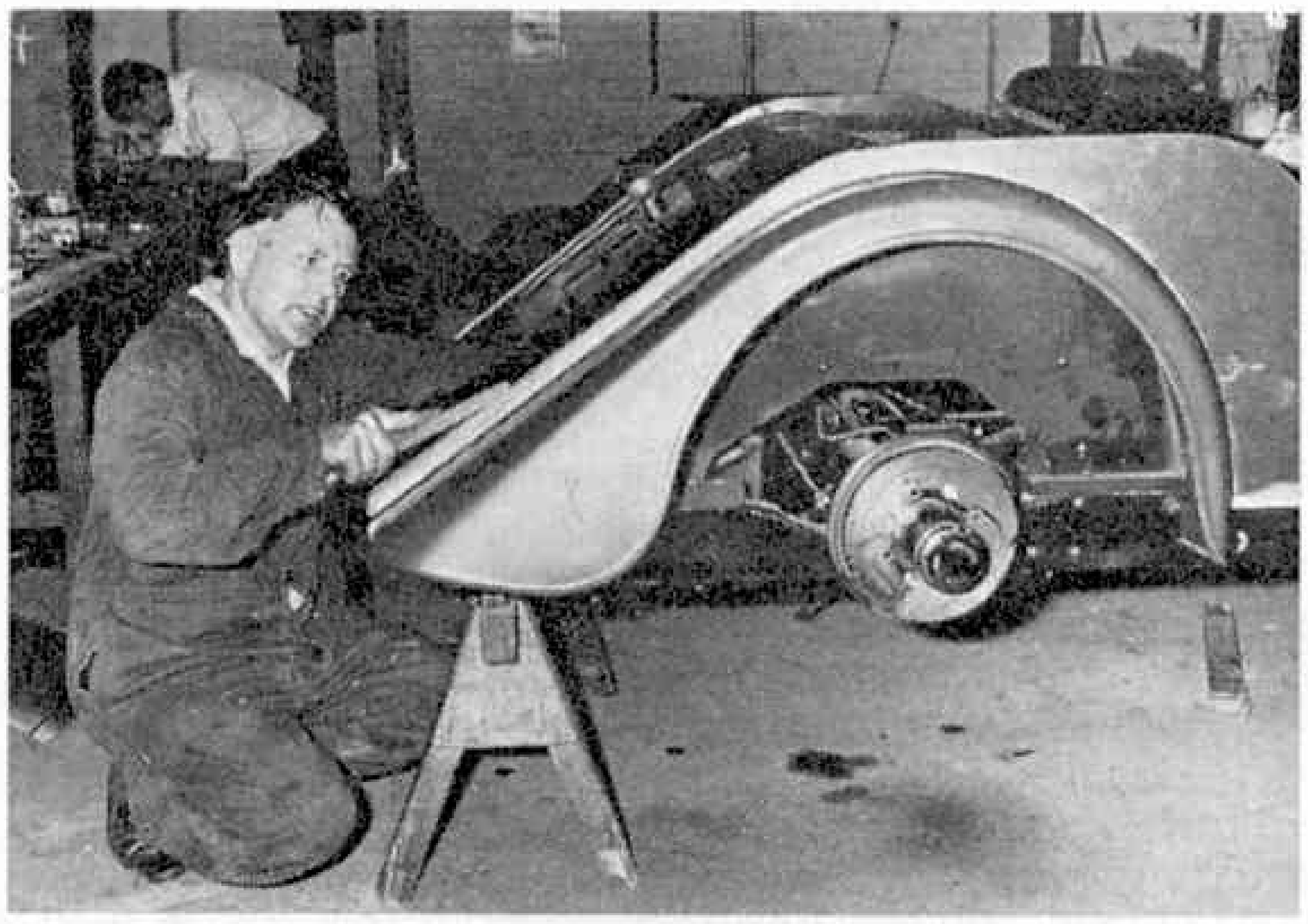
Shaping the bonnet of a Morgan is done by hand. A highly skilled and time consuming task.

Production came to a virtual stand-still during the first World War as the factory was chiefly concerned with munitions, but soon after the war demand was so great for inexpensive transport that the output rose to 50 cars per week. In 1925, Mr. George Goodall joined the company to take over the position of General Manager from Mr. A. Hales, who had been with HFS since 1911. George retired from this position in 1958, and his son, Mr. W. A. G. Goodall is now Works Manager. The three-wheelers continued to win award after award, with 1933 bringing a large number of world records. The original design had been so advanced that few basic alterations were made over the years, apart from the variety of different engines that were tried, and the addition of refinements such as electric-starters and front-wheel brakes.

In 1936, the first 4-wheeler was built and was exhibited at the London and Paris Exhibitions. This new model was called the 4/4, indicating a 4-cylinder engine and four wheels. 1937 saw the death of the Rev. H. G. Morgan and HFS became Chairman and Governing Director. (He was to die at the age of 77 on June 15th, 1959, to be succeeded by his son, Mr.

P. H. G. Morgan, present Governing and Managing Director.) Various models of the Morgan 4/4 were quickly produced for touring or racing, using such power units as a 1098 c.c. Coventry Climax engine developing 42 b.h.p. (one such model met with great success at Le Mans in 1938), or a modified 9 h.p. Standard engine. The latter was used in conjunction with a Moss gear-box, similar to those still being installed in current models.

The Second World War again caused a standstill in car manufacture in Malvern and the factory was turning out parts for the Oerlikon anti-aircraft gun, aircraft components and other precision work. In 1947, Mr. P. H. G. (Peter) Morgan joined the firm as Development Engineer and Draughtsman after his demobilisation. He had spent three years at the Chelsea Engineering College before the war and had himself successfully competed with his father in the 1939 RAC Rally. The long and difficult transition back from munitions to car manufacture was overcome and in 1950 the reluctant decision was made to cease production of the three-wheelers (to the chagrin of members of the thriving Morgan Three-wheeler Club!). This decision was due to the export demand for the four-wheelers in favour of their smaller counterparts.



**Hand finishing the boot and rear wings of a Morgan 4/4.**

Nineteen-fifty-four saw styling changes to the bodywork to introduce the familiar Morgan shape still produced today. The fifties and sixties saw various members of the Morgan family and many others hurtling around circuits and over appalling trials courses in versions of the 4/4 with tremendous success both in this country and in the U.S.A.

In 1968, what must be the ultimate in "hairy" sports cars was introduced when a 3½ litre Rover V-8 engine was squeezed into the 4/4 to produce a model known as the Plus 8. With a claimed top speed of 132 m.p.h. and acceleration which can dislocate the spine, this car is a real enthusiast's dream. Mr. Peter Morgan took me for a run around the Malvern lanes in his personal Plus 8 and the experience was, to say the least, memorable! One point that impressed me was the lack of hair-tearing slip-stream so often experienced in open sports cars. I can only assume that the driving position in the Morgan, close to the shallow windscreen, coupled with the shape of the enormously long bonnet, directs the howling gale over the driver's head. The Morgan is not built for comfort and the suspension is intentionally hard for competition driving, but I did not suffer any undue bone-jarring along the none-too-smooth Worcestershire lanes.

**Rubbing down the bodywork of a Morgan 4/4 before spraying.**

Today the Morgan Motor Company, with a staff of about a hundred, produces ten cars a week. There is a waiting list of eight months for them, which means an order book of some 330 Plus 8 or the more docile 4/4 models. The Company is reluctant to expand because one of the reasons for the popularity of the Morgan is its scarcity and exclusiveness. Such names as Brigitte Bardot and Jeremy Nabarro appear on the list of owners, as do Mr. Peter Morgan's son, Charles, and two sons-in-law, Lord Colwyn and Dr. Price.

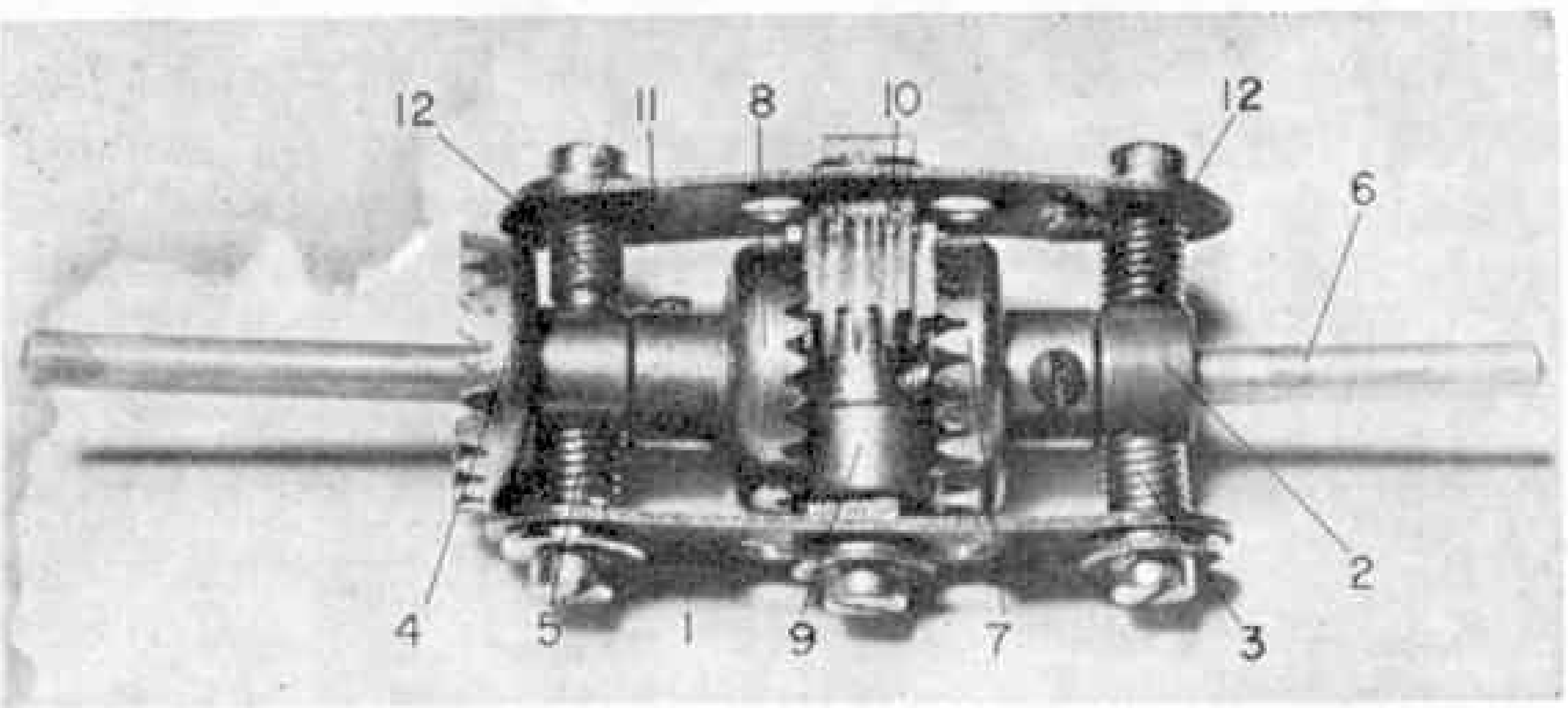
Recently, as part of the 60th Anniversary celebrations, the Morgan 4/4 and Three-wheeler Clubs were invited to take part in a Prescott Hill-climb meeting by the Bugatti and Ferrari Owners' Clubs. Nearly 300 brightly coloured 3 and 4 wheelers, dating from as far back as 1921, arrived to take part in glorious sunshine in the Hill-climb proper as well as a Morgan Cavalcade and Concours. The latter was judged by Mr. Peter Morgan, who was delighted by the turnout.

The Morgan has always been a car designed by enthusiasts, and built, tried and tested by enthusiasts for sale to enthusiasts. I am sure that Mr. Peter Morgan builds his cars because he loves to drive and compete in them. His father is reported to have said "Looking back through the years, seeing both errors and triumphs in their correct perspective, I feel I have enjoyed it all. The motor trade has been, as far as I am concerned, a most interesting business."

**Mr. Peter Morgan with his personal Morgan plus-8.**

# AMONG THE MODEL BUILDERS

## with 'Spanner'



**Another in the series of working mechanisms for small motor vehicles is this "baby" Differential designed by Mr. James Grady of Dundee, Scotland.**

### "BABY" DIFFERENTIAL

James Grady of Dundee (the man, you may remember, who specialises in useful mechanisms for smaller motor vehicles using 1 in. Pulleys with Motor Tyres as wheels) has been designing again—and with his usual success. This time he has come up with the very neat, yet fully-working "baby" Differential illustrated in the accompanying photograph.

In his covering letter to me, Mr. Grady writes, "In designing this mechanism, I deliberately refrained from using any expensive parts such as Couplings, etc., as my aim was to make it as cheaply as possible to catch the youngsters. Why should the boys with the big Sets get all the fun ? ! " Why, indeed, Mr. Grady !

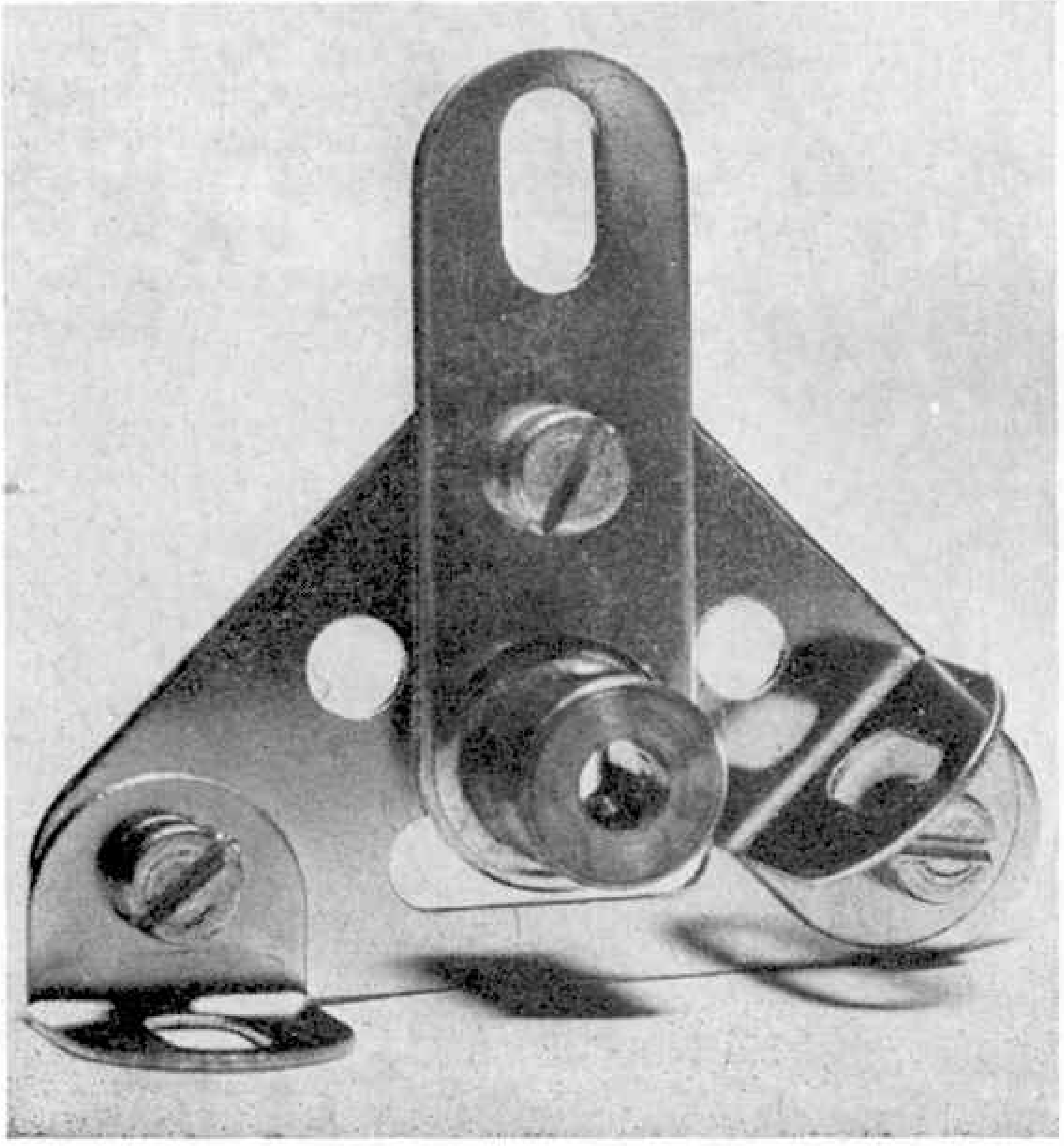
Construction of the mechanism has been made possible by the new-design 2 in. Strips with the additional hole in the centre. Secured by a Nut in the centre hole of one of these new 2 in. Strips 1 is a $1\frac{1}{8}$ in. Bolt, a Washer between the head of the Bolt and the Strip. One end of the Strip is then secured to a Collar 2 by a $\frac{3}{8}$ in. Bolt, but is spaced from it by a Cord Anchoring Spring 3 on the shank of the Bolt, a Washer also being carried between the bolthead and the Strip. At its other end, the Strip is secured to the boss of a $\frac{3}{4}$ in. Contrate Wheel 4, again being spaced from it by a Cord Anchoring Spring 5 and carrying a Washer under the bolthead.

Now journalled, free, in the Collar is a $1\frac{1}{2}$ in. Rod 6, on the inside end of which a second $\frac{3}{4}$ in. Contrate Wheel 7 is fixed. Another $\frac{3}{4}$ in. Contrate Wheel 8, is in turn, fixed on the inside end of a 2 in. Rod journalled, free, in the boss of Contrate 4. Mounted, free, on the $1\frac{1}{8}$ in. Bolt between Contrates 7 and 8 is a Collar 9 and a $\frac{7}{16}$ in. Pinion 10, after which a second 2 in. Strip 11 is lock-nutted on the lower end of the Bolt. The Pinion, of course, meshes with the Contrates.

To finish the Unit off, the ends of Strip 11, like Strip 1, are secured to Collar 2 and the boss of Contrate Wheel 4 by $\frac{3}{8}$ in. Bolts, Cord Anchoring Springs 12 again being used as spacers, and Washers again being carried, one under the head of each Bolt. A certain amount of careful adjustment may be required before the mechanism will operate freely, and it will be necessary to curve the 2 in. Strips slightly, but I can assure readers that Mr. Grady's sample unit illustrated worked extremely well, indeed.

PARTS REQUIRED

| | | | |
|---|---|---|---|
| 2—6 | 1—26c | 3—37a | 1—59 |
| 1—17 | 3—29 | 8—38 | 4—111c |
| 1—18a | | | 1—111d |



### For the Mathematically-minded

In lighter vein, Mr. Bob Hauton of Lincoln—another well-known member of Meccano modelling circles—has supplied me with an idea for a Meccano version of a puzzle which probably originated in early Eastern history.

For our purposes, the required apparatus consists of three 3½ in. Rods 1, 2 and 3 mounted at regular intervals in a long baseplate 4, built up from three 5½ × 2½ in. Flanged Plates bolted end to end. The Rods are carried in the bosses of Bush Wheels bolted to the centre undersides of the Flanged Plates. Mounted, loose, on the first Rod are, in order, a 3 in. Pulley, a 2 in. Pulley, a 1½ in. Pulley, a 1 in. Pulley and a ½ in. Pulley.

The object of the exercise is to transfer the Pulleys, *one at a time*, from Rod to Rod in either direction, ending up with all the Pulleys on the third Rod and arranged in the same regular order as when starting. *At no time, however, must a larger Pulley rest on top of a smaller Pulley.*

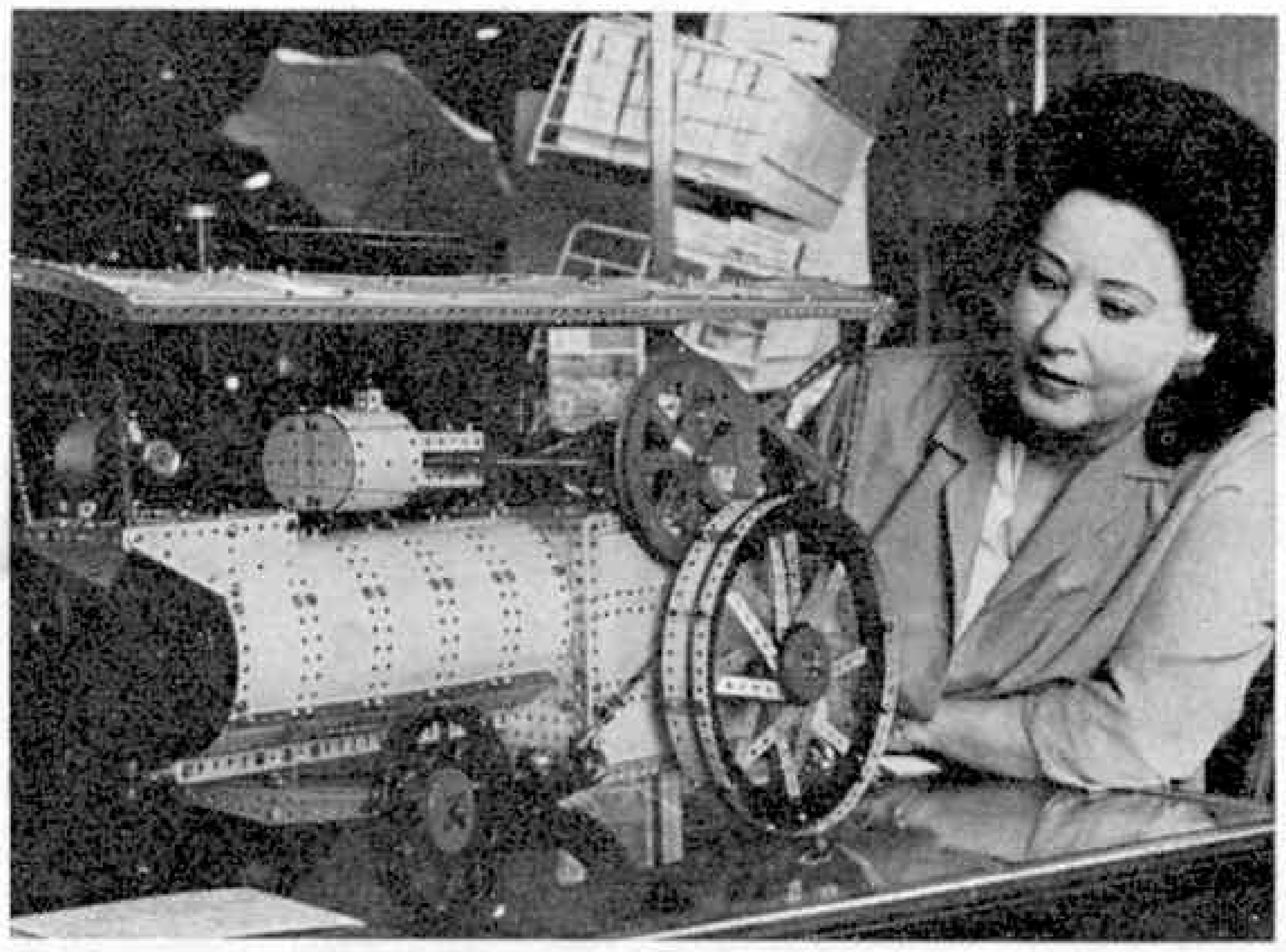
It sounds easy, but I can assure you that it is pretty difficult. The smallest possible number of moves necessary is 31, but what are those moves? If you work them out, jot them down on a piece of paper and send it to Meccano Magazine, Northern Office, Binns Road, Liverpool L13 1DA. We will supply thirty shillings worth of Meccano parts to the senders of the first three correct solutions pulled out of a hat on the last day of the month (November 30th). The winners will be allowed to choose their own selection of parts, so, get puzzling!

## Clock Pallet

Before leaving Mr. Hauton, a comment he made in his covering letter will, I think, be of interest to the clock-building fraternity. "I've just made a Meccano Grandfather Clock, powered by the current Clockwork Motor, which runs for a good 24 hours on one winding," he says. "The pallet device is really Pat Briggs' (a very well-known Meccano clock man!) and uses a 1½ in. Sprocket and a 1½ in. Corner Bracket with ½ in. Angle Brackets as the rocker. (See accompanying illustration.) The pendulum is approximately 5 ft. long to give 28 "ticks" per minute so that the pallet wheel shaft will also serve as the "second hand" shaft. This idea might well come in handy in future clock-building exercises.

## Dealer Display Model

At this point I should like to draw your attention to the accompanying traction engine photograph which, in fact, shows Mrs. Emily Kerkosh, an assistant in the toy department of the Co-op, Oxford Street, Bolton, studying a Showman's Engine model built by Mr. Ian Perrins of Turn Village, Ramsbottom, Lancs (aided by his wife!) and loaned by him to the store for display purposes. It was completed in one week—much to the joy of the Perrins children!



Mr. Perrins is very keen on model-making and has been building with Meccano for the past 17 years. All the parts used in the Traction Engine were purchased from Mrs. Kerkosh and I have it on very good authority that Mrs. Kerkosh is as proud of the model as Mr. Perrins!

## Stevenage Meccano Club

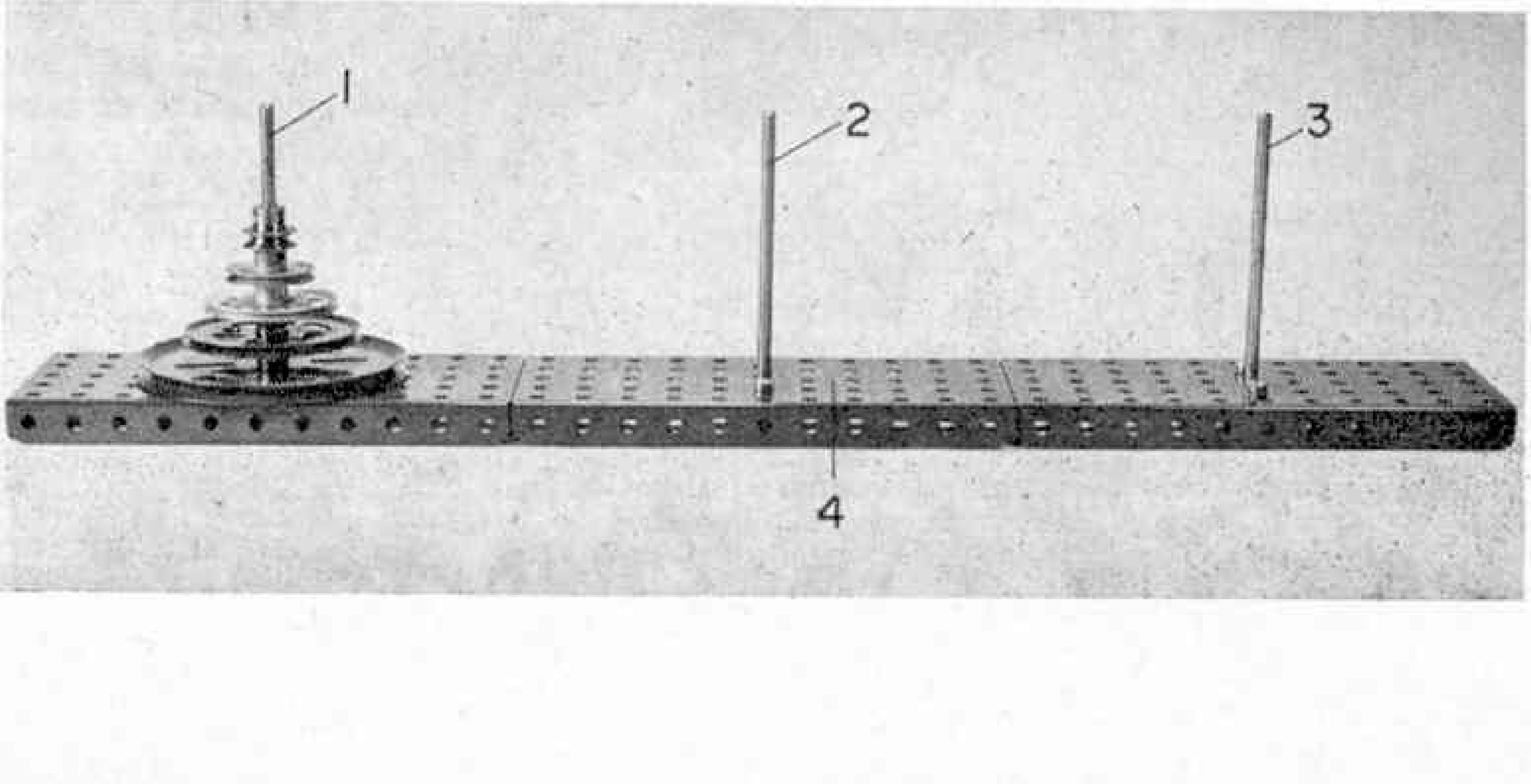
Finally, this month, I should like to close by reprinting a short report on the activities of the Stevenage Meccano Club kindly sent to me by the Secretary of the Club, Mr. D. Higginson, 7 Buckthorn Avenue, Stevenage, Herts.

"The Club," writes Mr. Higginson, "Began this year with two exhibitions, one held at St. Hugh's Church, Chells, Stevenage, and the other, on July 18th, at the Longmeadow Junior School Fete in Stevenage. This year there were 10 models at the Fete, including two Ship-type Roundabouts and a Double Ferris Wheel built by the Club. Mr. Peter Walton built a 7 feet-long Loco, LNER No. 10,000, based on the Super Model of the 1935-36 era, but he had several new ideas to add to his version of it, while Mr. Peter Brown made up a Meccanograph he had designed himself. This latter machine produced wonderful patterns and was operated by hand by the spectators. Mr. Brown also supplied a display of current Manuals and parts, all set out in racks, etc., and, in addition, he took a colour cine film of the Club display which runs for 4½ minutes. The Club Secretary, for his part, supplied six models of various types for the display.

"I would also like to mention two new members who recently joined the Club—Philip Hodge, who owns a No. 9 Set, and Anthony Morgan (10) who is our youngest member and very keen indeed to start this wonderful hobby." Very many thanks for your report Mr. Higginson, and our best wishes to your new members. Anyone interested in joining the Stevenage Meccano Club should contact Mr. Higginson at the address given above.

**Above right: Mrs. Emily Kerkosh pictured with Mr. Perrin's Traction Engine at Bolton Co-op store.**

**Left: A useful clock escapement pallet also suggested by Mr. Hauton, from an original idea of Mr. Pat Briggs of Nottingham.**

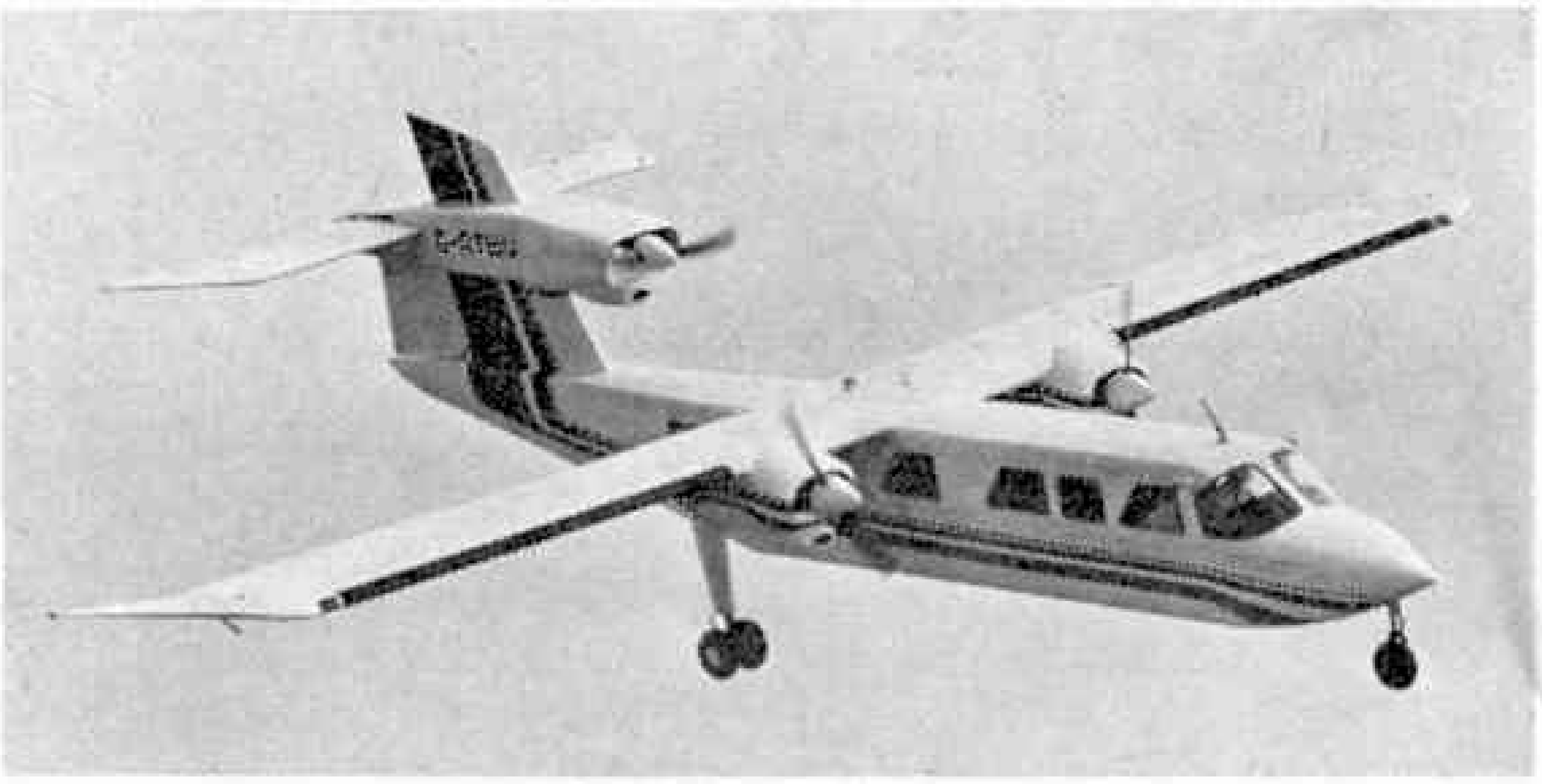


**Right: Not a weird five-part cone pulley, but an intriguing puzzle, suggested by Mr. Bob Hauton of Lincoln. The first three readers to find the solution will receive 30/- worth of Meccano parts.**

# AIR NEWS

by

John W. R. Taylor



The new Britten-Norman Islander Mk. III

## Meet the "Trislander"

AIRCRAFT DESIGNERS have always had a soft spot for three-engined transports. As a start the third engine gives a big increase in performance and payload compared with a "twin" using the same power plants. It is also comforting to know that if one engine should fail at an awkward moment, such as during take-off, the pilot does not have to make do suddenly with only half the normal power.

That is why some of the most famous piston-engined airliners of the inter-war years, like the Armstrong Whitworth Argosy, Fokker F.VIIB-3m, Ford Tri-motor and Junkers Ju 52/3m, had three engines. In the jet age the fashion has been reintroduced by the Hawker Siddeley Trident, Boeing 727 and Tupolev Tu-154. All of the piston-engined types had the third engine on the nose of their fuselage; the jets have it inside their rear fuselage at the base of the tail-fin.

As a result, when Britten-Norman's new Islander Mk. III transport made its debut at the recent S.B.A.C. Display at Farnborough, it was a surprise for more than one reason. Very few people had known previously that this Isle of Wight company was working on a "jumbo" version of its popular little airliner, with 17 seats instead of the usual 10. If they had known, they would hardly have expected to see the third engine mounted in front of the tailplane at the top of the aircraft's tail-fin. Yet that is where Britten-Norman have put it, and it not only looks right but functioned so well from the start that the company expects to begin deliveries of the Mk. III early next year.

Naturally enough, many people started referring to the new machine as the "Trislander" from the moment they first caught sight of it. The prototype, G-ATWU, was not allowed to perform at Farnborough, as it arrived there within hours of its first flight on September 11th. However, it created so much interest that short-haul airline operators can hardly wait to put it into service alongside the earlier Mk. II, of which nearly 200 had been delivered by the end of September, less than three years after production began.

Keen spotters will need no reminding that they have seen G-ATWU before. In fact, it started life as the Islander production prototype and flew for the first time on August 20, 1966. It was converted into a Mk. III by inserting a 90-inch section of standard parallel fuselage structure forward of the wing and fitting a new tail unit with the engine built into it. This emphasises how easy it will be to put the Mk. III into production, as 75 per cent of the parts of the two versions are identical, even allowing for strengthening of the rear fuselage and wing, and the fitting of larger wheels and tyres. Costs are also reduced by this commonality and Britten-Norman expect to be able to sell the Islander Mk. III for only £85,000, which is less than half the price of the nearest turbine-engined competitor.

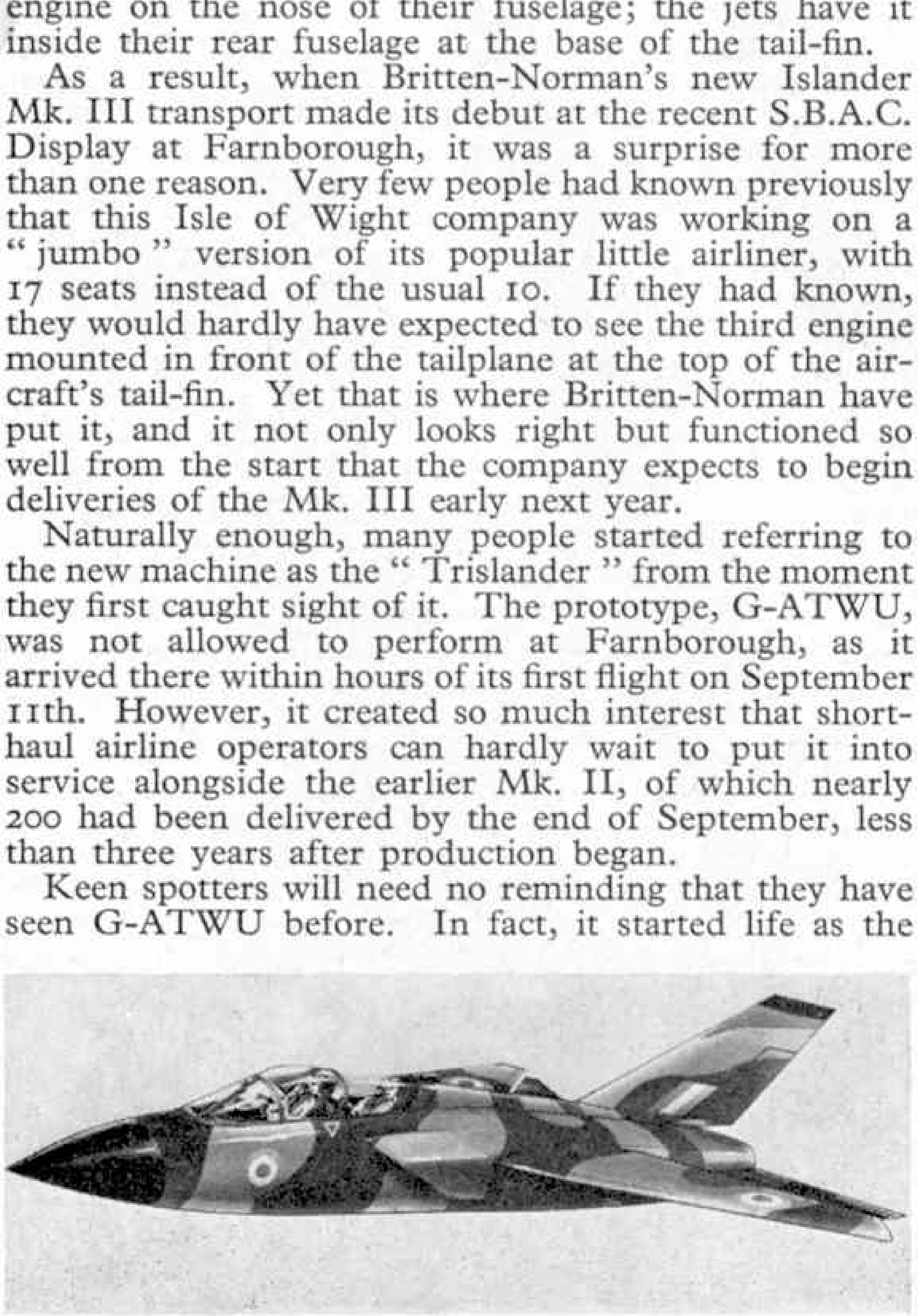
The third engine is another 260 h.p. Lycoming 0-540-E of the kind installed in the standard Mk. II. It gives the "Trislander" a cruising speed of 185 m.p.h., which is 25 m.p.h. faster than the twin-engined model. The wings have the new raked tips, with built-in fuel tanks, that are optional on the Mk. II, giving a span of 53 ft. Length is 43 ft. 9 in., height 11 ft. 2 in. and loaded weight 9,000 lb. With a pilot and 16 passengers on board, plus 33 cu. ft. of baggage, it will take off and climb to 50 ft. in well under 500 yards, which will certainly take some beating!

## MRCA Revealed

At Farnborough, for the first time, British Aircraft Corporation were able to display a fairly authentic model of the Panavia 200 multi-role combat aircraft (MRCA) which they are developing in partnership with Messerschmitt-Bölkow-Blohm of Germany and Fiat of Italy. With currently-planned orders likely to total 385 aircraft for the R.A.F. and up to 420 for the *Luftwaffe*, this could prove to be the biggest aviation programme in Europe, even if the Italian Air Force decides not to buy.

Work on the MRCA began in July 1968 to meet mutual requirements for a supersonic combat aircraft for service in the late 'seventies. At that time the R.A.F. wanted a two-seat strike/reconnaissance aircraft to replace the cancelled TSR.2 and F-111K. Germany and Italy were looking mainly for a single-seater for close air support and air superiority fighter duties. Panavia, the company formed in Munich by the three partners to handle the project, felt that these different needs could be met by two versions of the same design with about 80 per cent of the components common to both.

By this year the Germans had decided that they would concentrate on the two-seater, like the R.A.F. Italy, left to face alone the extra costs of developing the single-seater and plagued with serious political problems, did not sign the Memorandum of Understanding which initiated the construction of seven prototypes on July 23. It has since done so, although there may never be a single-seat MRCA now.



The two-seater Panavia multi-role combat aircraft (two RB 199 turbofans) being jointly developed by British Aircraft Corporation, Messerschmitt-Bölkow-Blohm and Fiat.

Little can be published about the two-seater, although its general appearance is shown in the illustration on page 656. It will have tandem cockpits, a "swing-wing" and two 14,500 lb. thrust Rolls-Royce RB.199-34R afterburning turbofan engines, built jointly with MTU of Germany. The cut-back air intakes are very like those of the Soviet MiG-23 fighter, since adopted also for America's new F-14 and F-15. Clearly, the MRCA will need a speed of at least Mach 2 (1,320 m.p.h.), very complex electronics, a lot of fuel and a wide range of different military loads if, as planned, it is to replace the R.A.F.'s Canberras, Vulcans and Buccaneers, and the *Luftwaffe's* F-104G Starfighters and Fiat G91s. Its future will be watched with special interest by a great many people.

### Airborne Delivery from 10 feet

The thought of dropping two million pounds of supplies from a large transport aircraft flying only five to 20 feet above the ground is enough to make the average pilot wince with horror. However, pilots of the Royal Air Force's Air Transport Development Unit, based at Abingdon, have already exceeded this total during tests of their new Ultra Low Level Air Despatch System, which will be used operationally by Air Support Command.

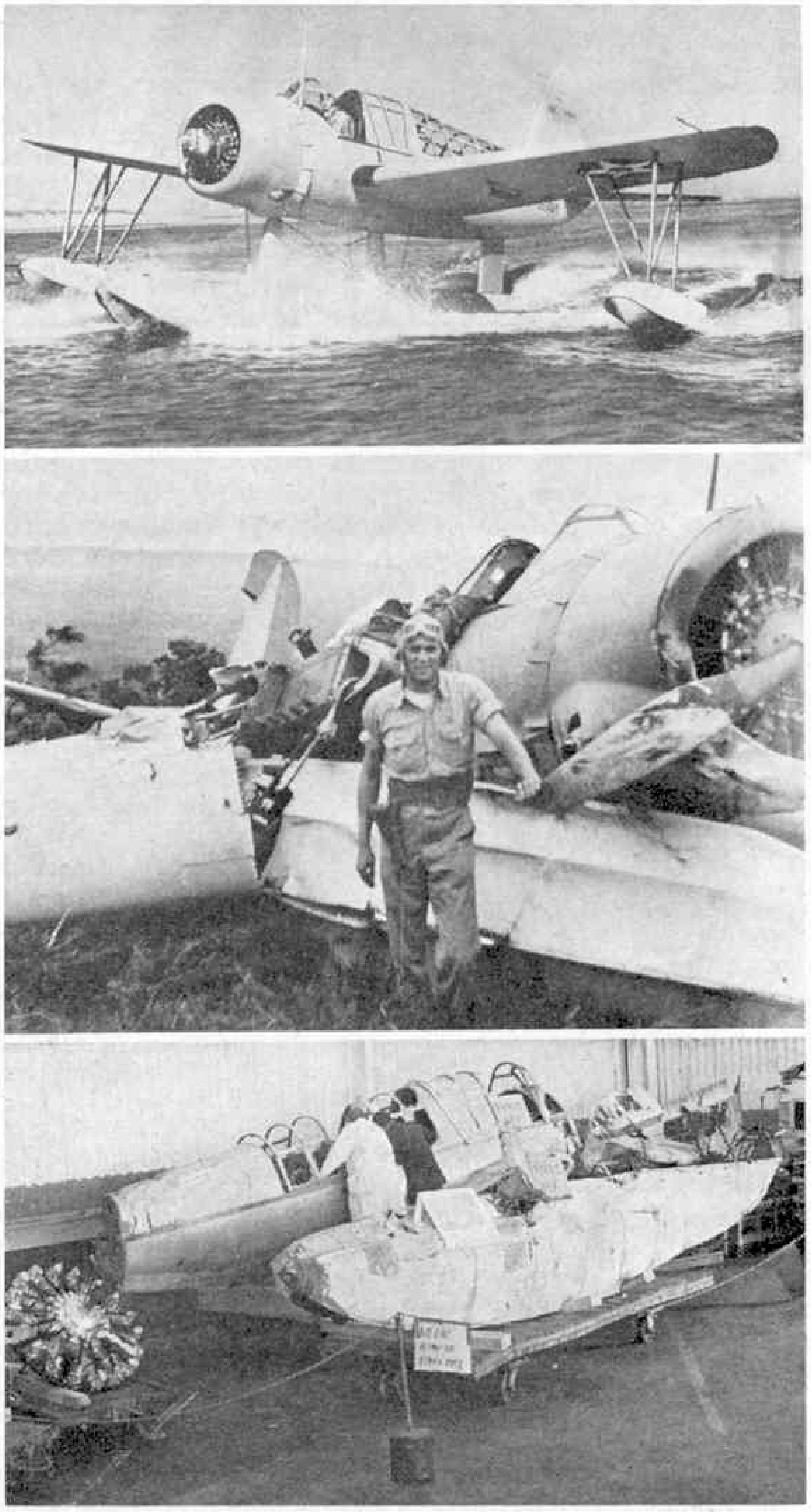
As shown in the above illustration on this page, the trials have involved flying a four-turboprop Hercules freighter at a steady speed of 145-155 m.p.h. a few feet above the dropping zone while a parachute drags equipment or stores out of the back of the cargo-hold. The loads are mounted as crash-proof units on platforms, using a Hawker Siddeley Skydel side-guidance system to ensure that they are extracted cleanly. It is claimed that far greater accuracy is possible than if the loads were parachuted from the usual height. In addition, it would probably be possible to supply small units, operating behind the enemy lines, without the enemy being aware of what was happening.

### Kingfisher Mystery Solved

Mystery surrounding a wrecked Chance Vought OS2U Kingfisher floatplane, retrieved from a lonely British Columbia island where it had lain since 1942, was solved recently when the pilot wrote to Vought Aeronautics who are rebuilding it for display on the battleship *North Carolina.*

It seems that the Kingfisher was one of three which were flying to Alaska and ran into dense fog off the coast of Calvert Island, 300 miles north of Vancouver. According to the pilot, then Ensign Mac J. Roebuck, "I veered away from the others to avoid a collision and was just flying along when all of a sudden the Kingfisher stopped. I couldn't see a thing and for a few seconds kept right on 'flying'. I was doing about 105 m.p.h. at the time, and when we hit the side of a mountain at about 1,500 ft. altitude we tore off a float and the right wing. I couldn't have landed it any better if I could have seen where we were going."

With the aid of his mechanic and six R.C.A.F. men, Roebuck later removed the guns, instrument panels, radios and engine from the wrecked OS2U as salvage. The engine was then loaded on to the torn-off wing and the "sled" was pulled down the mountainside. The rest of the machine remained on the mountain until 1964, when an R.C.A.F. helicopter picked up the fuselage, float and left wing and flew them to Port Hardy, on the British Columbia coast. It was intended to exhibit the remains in the Air Museum of Canada at Calgary. Instead, the Museum passed them on to the U.S.S. *North Carolina* Battleship Commission, which arranged to have the whole lot flown to the Vought factory in Dallas, Texas, on board a Navy C-118 transport last February. By the time the Kingfisher emerges from the factory, it will look as good as new.



**Top: The OS2U-2 Kingfisher as it appeared in World War 2. Centre: the same aircraft after a crash on a mountain slope. Ens. Mac J. Roebuck also seen in the photograph walked away from the wreck without a scratch.**

**Lower: The aircraft is now being rebuilt by Vought.**

The Sherman in action, with infantry support, and 'John Wayne' on board to give encouragement.

# BATTLE

## by Charles Grant

## PART XXXII—Something different

THE OBJECT of this particular exercise was really a twofold one—to take advantage of a little unaccustomed sunshine and to prove that wargaming need not necessarily be carried out within the confines of four walls and on a comparatively small wargames table. Of course, it must be conceded that the whole thing was carried out in a fairly light-hearted manner, and it certainly took some time before the eyebrows of neighbours—elevated as high as they could be at the sight of sundry individuals crawling about on a lawn—returned to their normal position. Still, it was all good fun and thoroughly enjoyed by the participants—indeed their cheers and loud vocal encouragement of their respective troops might have been heard many hundreds of yards away.

Naturally, when considering a move into the outside world, certain considerations had to be looked at with some little care. Obviously, to begin with, the normal 20 mm figures used heretofore were of no use at all. However many times the mower was pushed across the lawn, the grass, short though it might have been, was as an impenetrable jungle to the men of the 20 mm units we have been using all along. The rules, too, necessitated examination, for—playing on a stretch of grass some 40 feet by 15—instead of the normal nine by seven feet table—the game, if the normal move rules had been adhered to (infantry move 3 inch and so on), would have given the contenders hours of labour before the opposing troops even came in sight of each other. In this predicament, it seemed that only larger troops, and correspondingly larger vehicles, would do the trick, and we were fortunate enough to be in receipt of some very generous latter-day " lease-lend " from the well known firm of Richard Kohnstam ('RIKO'), who most magnanimously supplied the requisite larger scale vehicles and troops for us to carry out our little experiment, the former being of Tamiya manufacture, and the troops the large scale Airfix ones. The fact that the vehicles were 1/35 scale and the troops 1/32 did not really matter very much, the scales being close enough not to make the men look over-large.

One of the German half-tracks in a spot of bother—the inmate not too happy, either !

It was decided that the game should be as basic as possible and to this end only simple forces were used, the infantry group described already in " Battle ", but carried in two instead of three half-tracks, while each force was supported by one tank of the appropriate nationality. In the case of the German force it was the inevitable Panther, while the Americans were provided with a Sherman. Somewhere along the line the U.S. force added an armoured car to their array (I never did find out just how this occurred!). There was strong temptation about to allocate names and identities to each of the troops involved, and indeed the 'American' player was, from time to time, heard to mutter instructions and encouragement to " John Wayne " and " Henry Fonda " while, the Germans being uniformed as Waffen S.S., *their* general seemed to regard their officer as " Obersturmbannfuhrer Lutzig " or some such.

Then there was the question of moves and ranges of the various weapons. This involved but a simple calculation, the multiplication by 3 of each required move and range. Thus, the infantry move became one of 9 inch—the dismounted move, that is—while those for the tanks became 24 inch and 18 inch for the Panther and Sherman respectively. (We assumed that there were no roads and all moves were therefore considered to be ' cross country ' ones). Ranges were increased in the same proportion, rifle range becoming 27 inch, the bazooka's becoming 24 inch, for instance, while the tank gun ranges shot up to something like an incredible twelve feet! Everything else, the deflection stick and so on, were as used for the ordinary table game, and although no specific cones of fire were constructed for the outdoor ranges for Machine gun and sub-machine gun, the effect of these weapons was quite successfully estimated. When dispute arose, an independent umpire was called in to arbitrate.

And so we began, the ' American ' player advancing from the south end of the lawn (i.e. the battlefield), and the ' German ' from the north end. It was at once decided—in order not to complicate things too much—that there should be no restriction on visibility, wargame-wise, and the players therefore had an uninterrupted view of many ' miles ' of territory. The first ' sightings ' did not take long in coming, and both opposing tanks opened fire simultaneously. Forthwith, there was an immediate halt to the proceedings when the dice were thrown and one promptly disappeared from sight in the grass. It was discovered after a prolonged ' cordon and search ' operation, and to avoid further mishaps of this nature, a small table was procured and set up nearby for dice-throwing purposes. The game then proceeded, both infantry groups coming up as fast as they could in support of their armour, and deploying—I daresay somewhat to their surprise—in the lush undergrowth. The comment was heard that ' a course at the Jungle Fighting School would do them a power of good '.

However, to the deep chagrin of the ' American ', his Sherman soon became a victim of the formidable Panther, and the latter went charging on dealing out mayhem and destruction in all directions, the American armoured car being its next victim. The bazooka team was lurking about in a small copse (for this read ' tuft of long grass ') and let fly a round at the triumphant Panther. As ill-luck would have it, this was a clean miss and before another round could be fired, the bazooka men were under fire from the S.S. riflemen, which did them no good at all. Putting paid to them meant the end of the fight for the Americans, their ' general ' being led away quietly, protesting about his ' rotten dice luck ', and that it was the last time he'd fight in the garden. That remains to be seen.

**Waffen S.S. in action—pretty hard going in such a jungle !**

Anyway, although it was lots of fun—one character dug little pits near the tanks, filled them with paraffin-soaked rags and set light to them, providing a realistic simulation of a tank ' brewing-up '—it could be seen that there were indeed quite considerable possibilities in this outdoor game. The room for manoeuvre, the extended moves, and so on were surprising, and with some more serious preparation, such as the construction of a few houses (or merely ruins) in the proper scale, the presence of a few trees (old wallflower plants are just the job), then a really intriguing and realistic game could be had.

Why not try it next summer ?

**American assembly point—the Sherman about to move away from the other vehicles.**

RADIO

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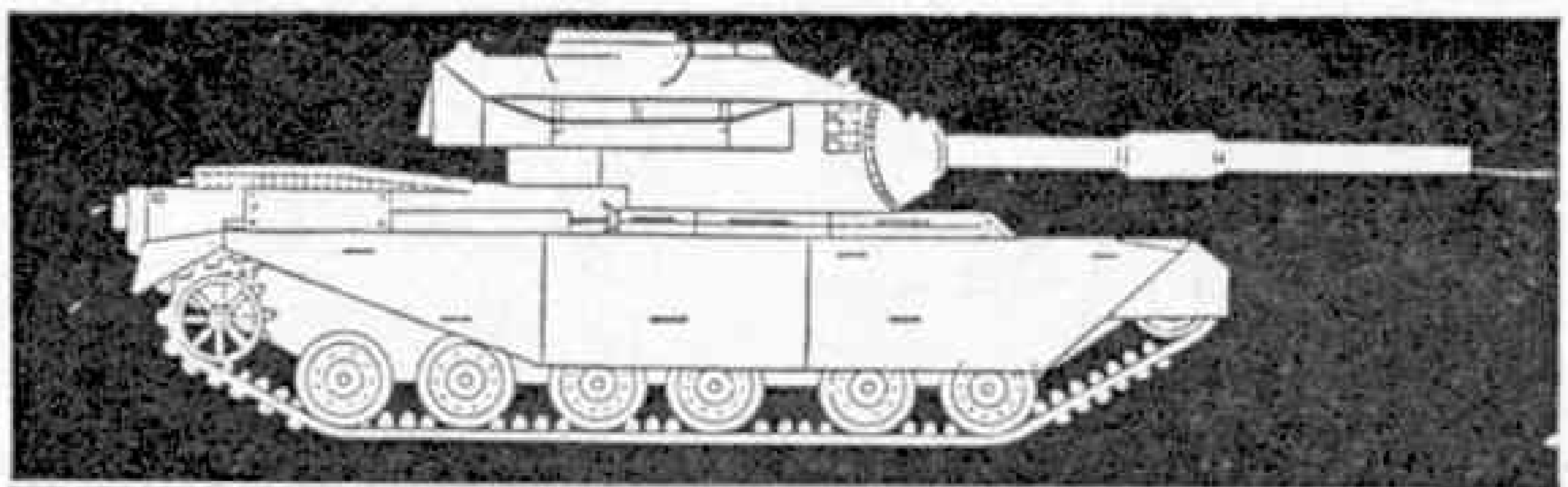


# MILITARIA

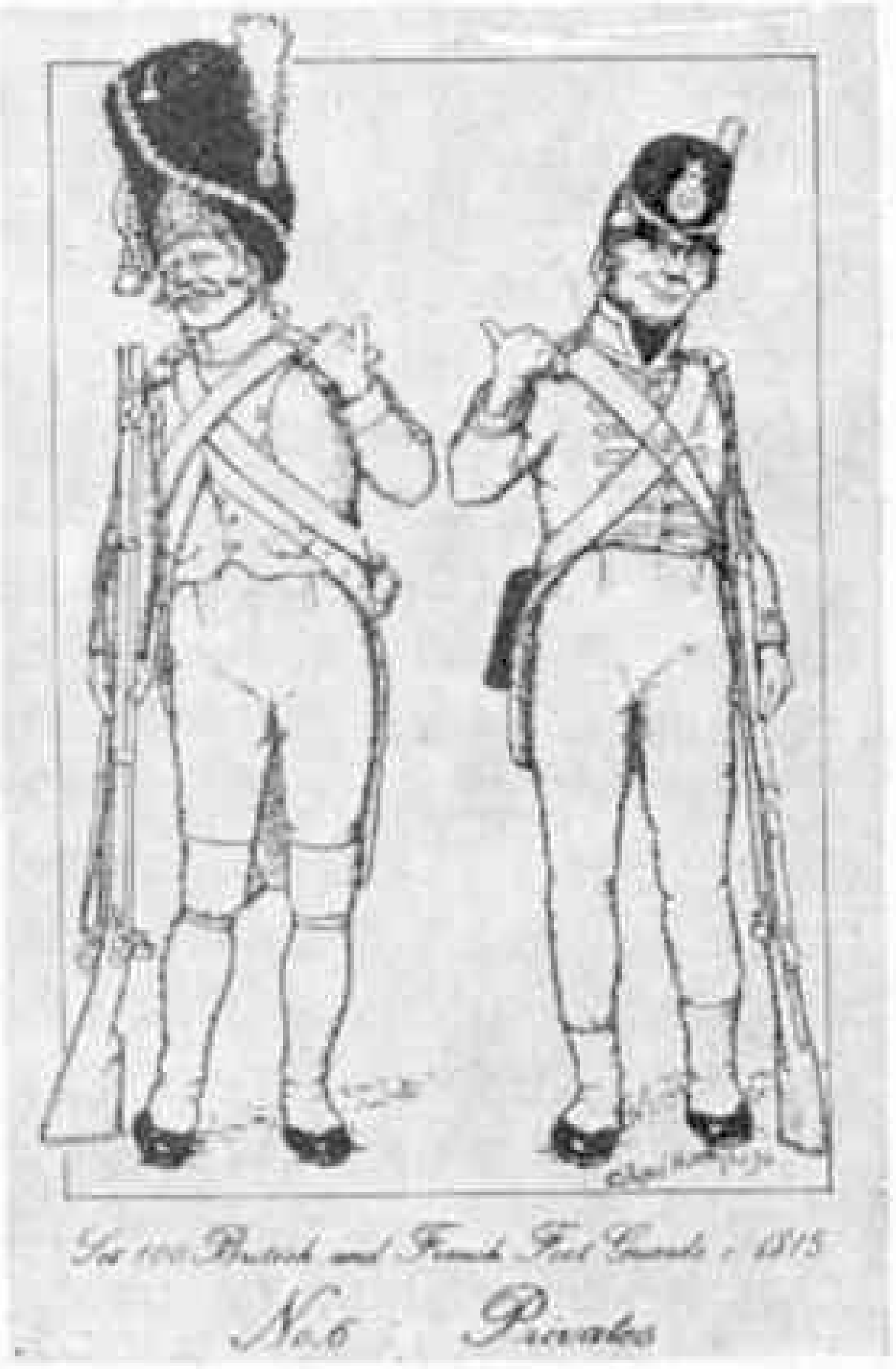
### A REVIEW BY CHARLES GRANT

**In ‘On the Editor's Desk’ this month appears a short introduction to a new M.A.P. publication entitled ‘Military Modelling’ and regular readers of this magazine will, no doubt, be pleased to hear that Charles Grant will be a regular contributor to its pages.**

**For some time now many readers of both this and our sister magazines have expressed a wish to see a publication devoted purely to Military matters and to fulfil this need ‘Military Modelling’ has been born. It would be rather pointless to produce features of a specialised nature such as Charles Grant's in two magazines and so with some regrets ‘Battle’ and ‘Militaria’ will no longer appear in the contents of this magazine. This does not mean that no further military material will appear, so from time-to-time we will be presenting features of a general nature in this vein. Meanwhile, I am sure readers will join with me in wishing Charles Grant every success in ‘Military Modelling’.**

I was much impressed by two of the latest additions to the MINITANKS range (Richard Kohnstam, 13-15 High Street, Hemel Hempstead, Herts.), these being the howitzer tanks, M.109 and M.108, the medium and light S.P. guns. Both models are really excellent in finish and appearance, and the moving parts—gun turrets, ‘rear spades’ and so on—operate very satisfactorily. Some time ago I wrote about the Aurora M.109 in the larger scale, saying what a formidable looking and business like appearance it had, and these smaller examples are, for my money, every bit as good. They are a great temptation to a wargamer, not already committed to a period, to get cracking on a present-day set-up. The prices, naturally enough, somewhat exceed the halcyon days when the Minitanks range averaged about half-a-crown each—if my memory is not at fault—but at 3/9 and 4/-—for the light and heavy models respectively—they are in no way over-costly and are indeed well worth the money.

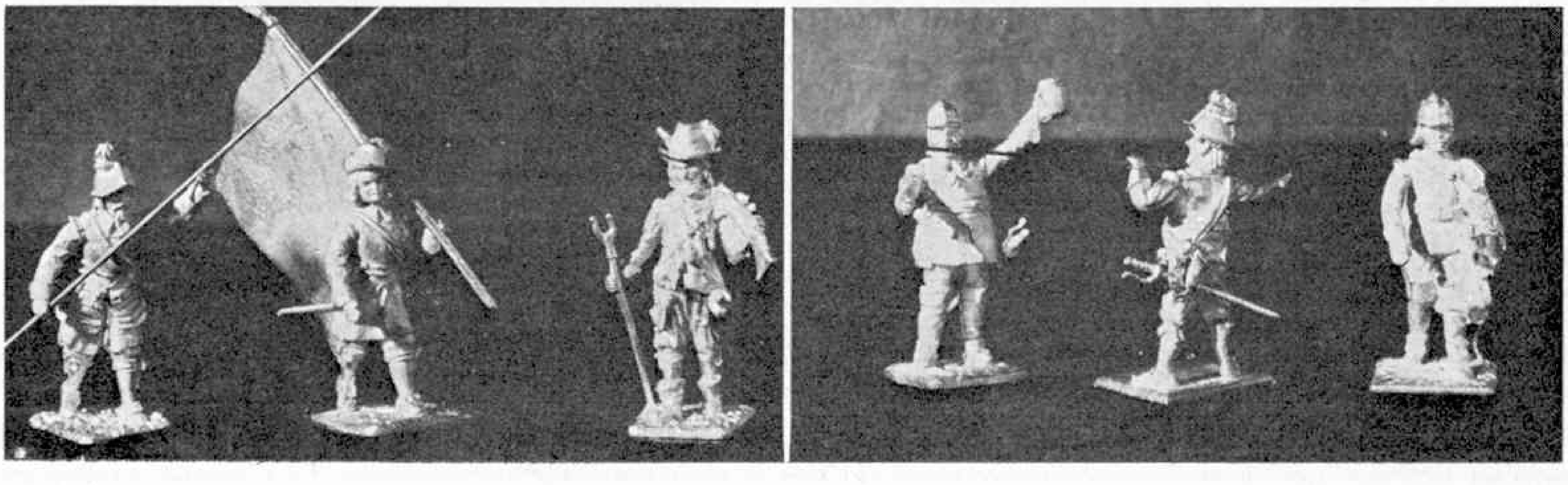
The ALMARK PUBLISHING CO. (104-106 Watling Avenue, Edgware, Middlesex) has brought out two books on uniforms—“British Infantry Regiments 1660-1914” and “Scottish Regiments 1660-1914”, both by A. H. Bowling, and available in paper covers at 17/6 or hard covers at 25/-. For some reason they are not uniform in size—as I would have thought preferable—the “Scottish” volume being considerably larger in format than the other. They are designed as ‘concise and comprehensive guides’ to the uniforms of the periods they deal with, but it is obvious that within the conpass of 48 pages for the British and 24 for the Scottish regiments the surface of the subject can barely be scratched, uniform history being a subject concerning which many a ponderous tome has been written. The technique employed is to reproduce a large number of coloured illustrations of the uniform figure—each being about 1¾ in. in height—and supplement these with other line drawings of figures and equipment, as well as photographs of men and equipment. I'm not too keen on the very small figures, it simply not being possible to show great detail, but there is no doubt that the books contain quite a surprising amount of information considering their size, as such being excellent for anyone with an awakening interest in uniforms and other militaria.


Set 100 British and French Foot Guards · 1815
No.6 Privates

**Left:** **One of the latest series of Bellona Military Vehicle Prints—full of information and good value.**

**Right:** **An example of one of the latest series of North's “Paint Your Own” Cards—from the centenary set.**

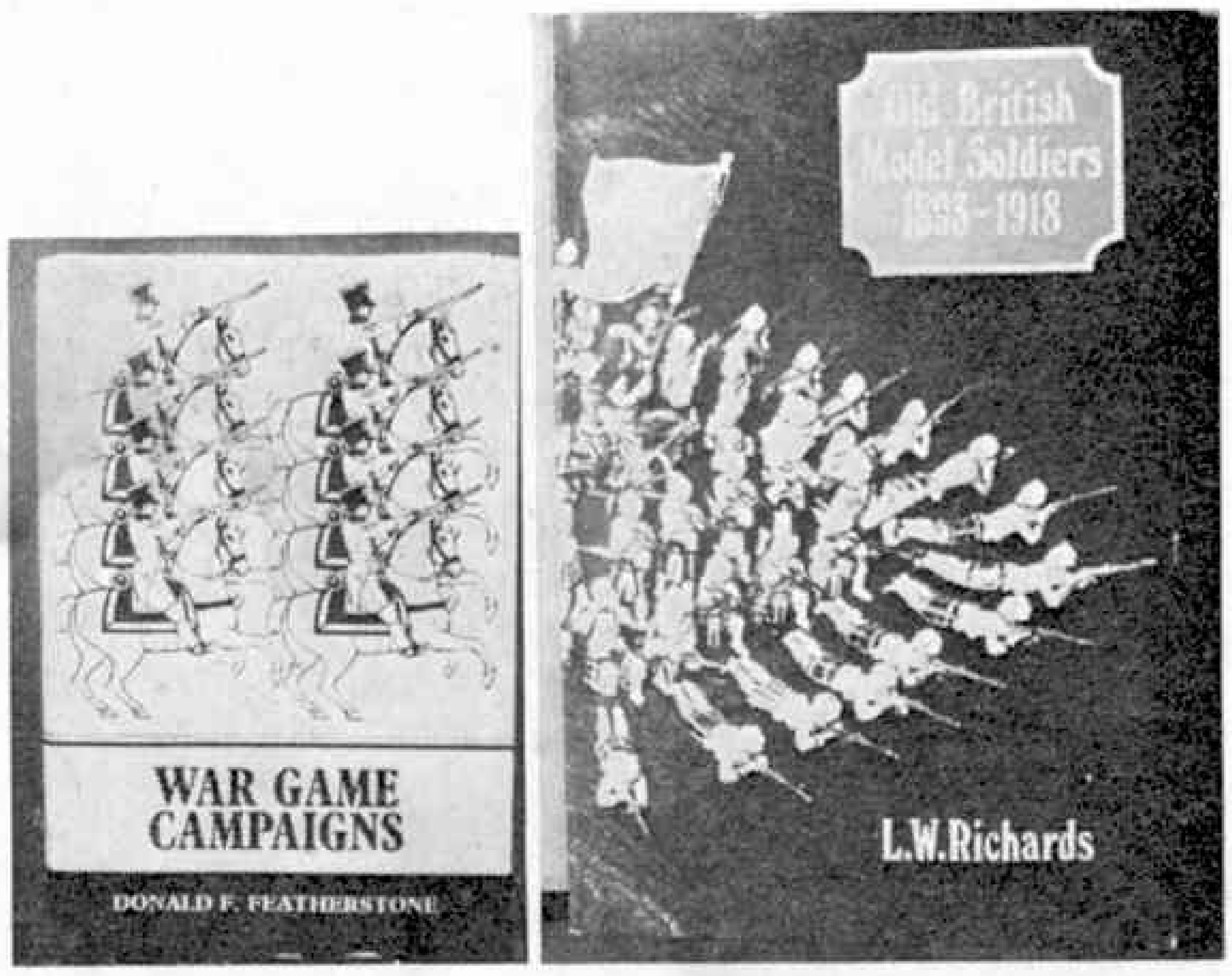
In the last “Militaria” I was pretty ecstatic about



**A selection of the magnificent 30 mm. figures of the English Civil War produced by Les Higgins Figures.**

the 20 mm. metal figures of the Marlborough period produced by LES HIGGINS MINIATURES (of 78 Northampton Road, Wellingborough, Northants.) and now I can't help being similarly enthusiastic about their 30 mm. English Civil War models—the 'Jason' line. As a matter of fact, I shouldn't really have to say much, as the photographs speak for themselves, and one can see at a glance just what high quality figures they are. They come in a range of several orthodox military attitudes and some less so—as witness the happy trooper exuberantly waving his jumbo-sized mug, doubtless filled with some potent beverage. Foot figures are 4/6 each and there are 18 different types in the range. They can all, without shame, stand next to Ted Suren's "Willie" figures and suffer nothing by any comparison—and no one can say better than that. As with the 20 mm. Marlborough range, I recommend them totally without reservation.

Latest volume in D. F. Featherstone's continuing story of the wargame is "Wargame Campaigns" (Stanley Paul, 35/-). Despite the occasional spot of 'gimmickry' and a liking for the 'formula' type rule (by which I mean something like setting up a situation by a long series of dice throws) there is a considerable amount of good stuff in the book. The various chapters, dealing with a wide variety of wargame campaigns from a Viking Raid to a Punitive Expedition to the North-west Frontier in 1936, through mediaeval and Napoleonic campaigns and many others, are well illustrated with maps and plans. The photographs particularly those dealing with earlier period fights are good, although one or two of the modern period ones show signs that the terrain has been pretty haphazardly flung together. The chapters on forming and running a wargaming club are also useful for the group of enthusiasts just getting together, and the author voices the opinion, with which I am at least 75% in agreement, that standardisation in wargames rules is not necessarily an ideal to be pursued to the exclusion of all else.



**Left :** Latest in the series of wargame books by the prolific writer on the subject, Donald Featherstone.

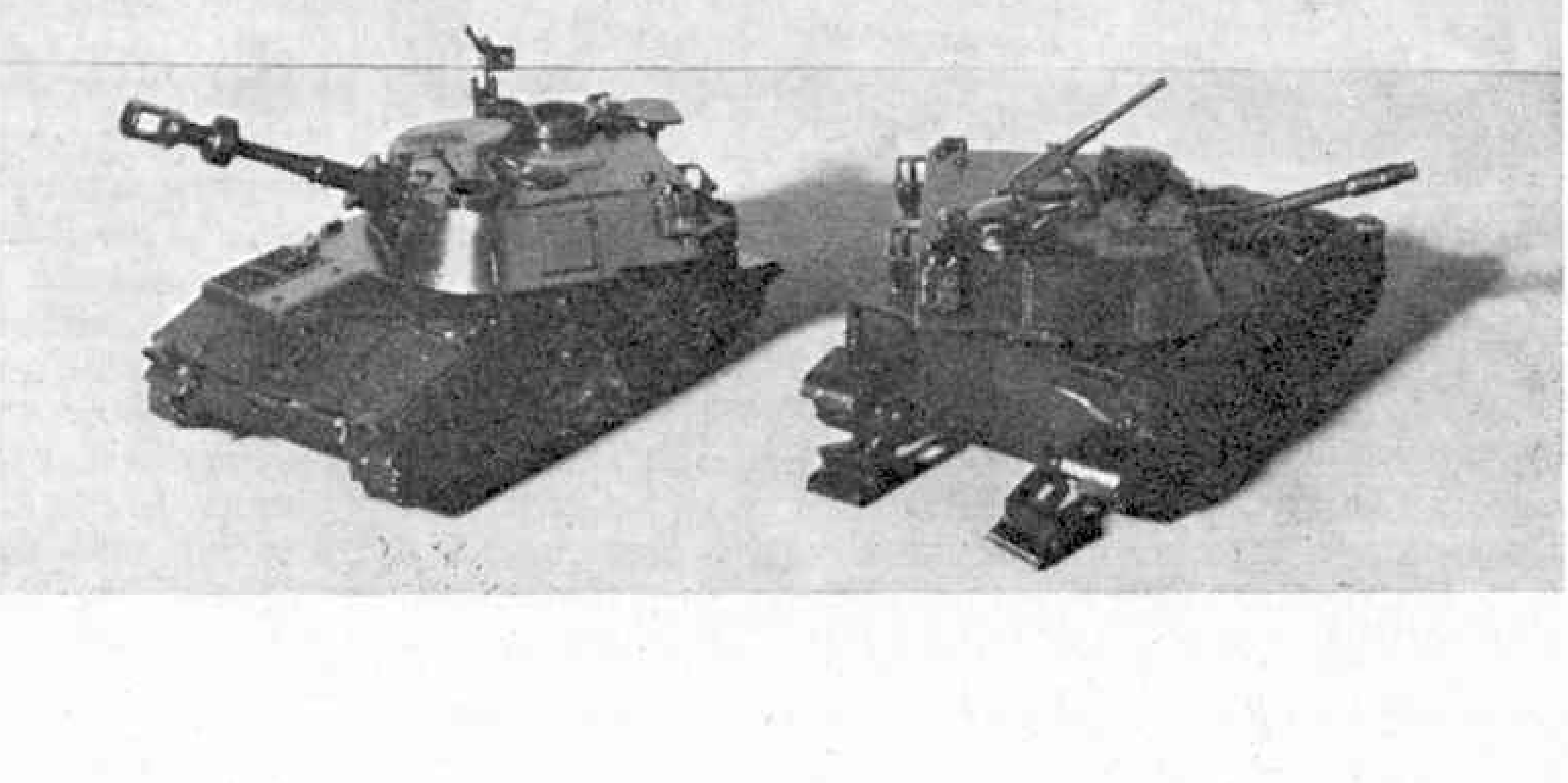
**Right :** A most informative book by L. W. Richards, the acknowledged authority on the subject of the old metal 'toy soldier'.

From the antiquarian point of view, L. W. Richards is without doubt the foremost authority on the model soldier of yesteryear. Now that in these degenerate days even Britains—the oldest of the manufacturers and inventor of the old hollow-cast leaden figure—produces nothing but plastics, the value of the old metal 'toy soldier' is shooting up in value quite remarkably. Mr. Richards' book, "Old British Model Soldiers 1893-1914" (Arms and Armour Press, 677 Finchley Road, N.W.2) is an extremely useful guide to what was produced in the way of 'toy soldiers' by many firms, mostly now extinct, in the years up to the end of the Great War. It costs 30/- and is a mine of information, every page containing photographs of treasures now found only with difficulty and in auction rooms, where they fetch fantastic prices. Every type of species is pictured, from the first Britains Life Guards, through running Highlanders, artillery, Red Indians, up to the old machine gun motorcycle combination, which I treasured myself more years ago than I am prepared to confess. Excellent value, indeed, this book.

The latest series of 'Paint Your Own Cards' by Rene North (53 Blackheath Park, S.E.3) covers a wide range of uniform topics from French Carabiniers of the Napoleonic period to Austrian Uhlans of 1914, and they include an amusing set "British and French Foot Guards". This is set No. 100, a sort of centenary one. Each card shows two figures—one we illustrate—one being a British Guardsman and one his French opposite number. They—like all the sets—are accompanied by explanatory text and colouring instructions, and they are, as has been said before, quite the most inexpensive way of amassing accurate information of uniforms and the men who wore them. Excellent value at 7/6 per set.

BELLONA PUBLICATIONS (Hawthorn Hill, Near Bracknell, Berks.) have brought out further additions to their Military Vehicle Prints, these being numbers 20 to 22, and they cover a very wide range of armoured fighting vehicles, from German PzKw III to the Soviet ISU-122, and many others. These booklets contain photographs, diagrams, drawings and every possible detail of performance and specification and are quite invaluable for the tank enthusiast. Written and illustrated with great authority, each 'print', of 20 pages, is cheap at five bob, with postage if ordered direct.

Two of the very fine recent models by Minitanks—the M.109 and M.108—impressive models.

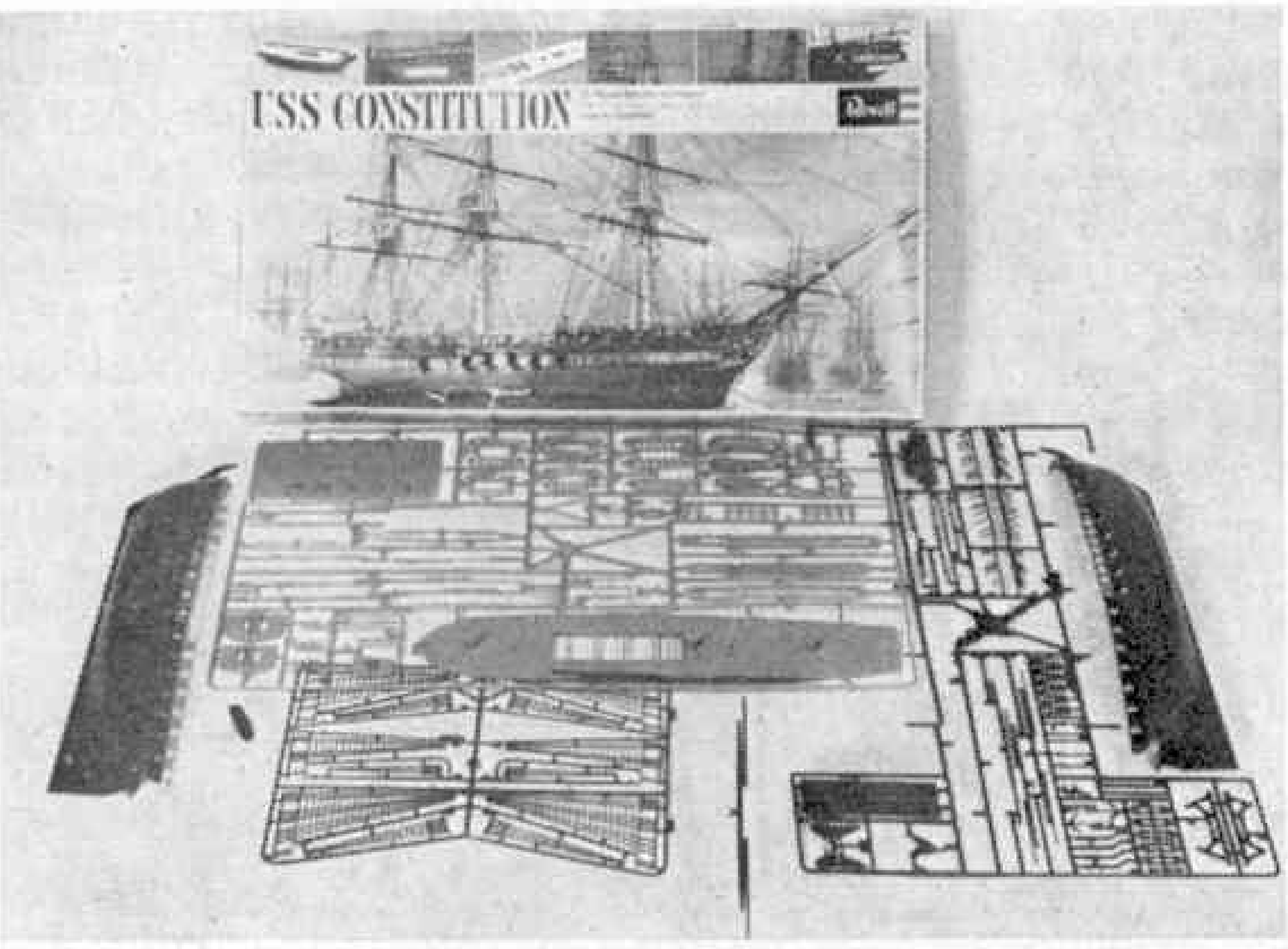


(Continued from page 644)

## U.S.S. Constitution

For lovers of large and intricate models, especially ships, Revell have produced a superb plastic kit of the U.S.S. Constitution a frigate built in 1797.

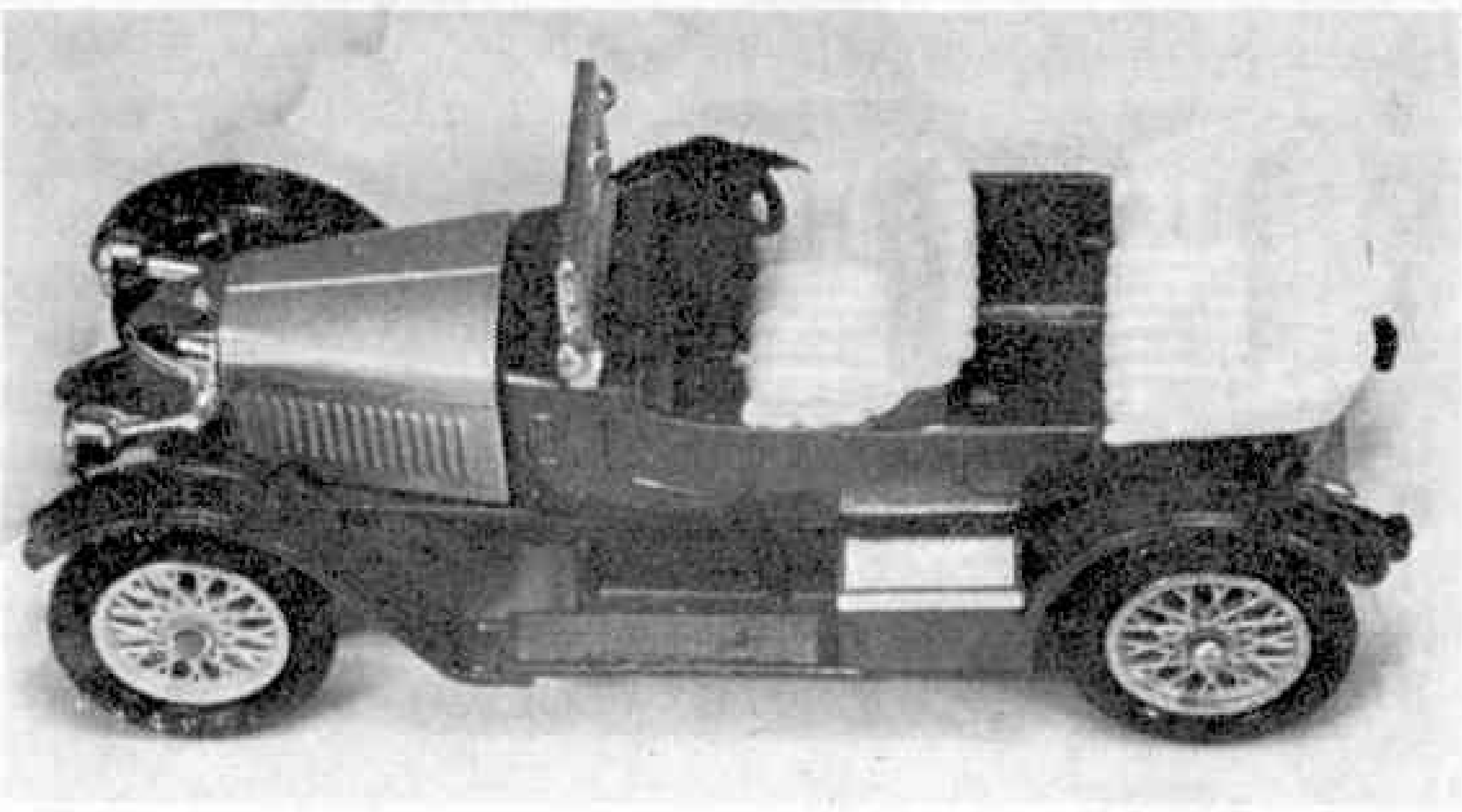
The model contains hundreds of parts, and all the necessary rigging to produce what is on completion a superb model in all respects. (The photograph below will give a clearer indication of just how much you get for your money.) It measures well over 20 in. in length and stands almost as high. We were particularly impressed with the high quality and detail of the parts, especially the rigging which looks very realistic. Definitely not one for the novice but for the more experienced builder something to while away the long nights ahead. Priced at £2 2s. 0d. approximately it's certainly a value-for-money kit.



**The 'USS Constitution' a superbly detailed kit from Revell and excellent value at £2 2s.**

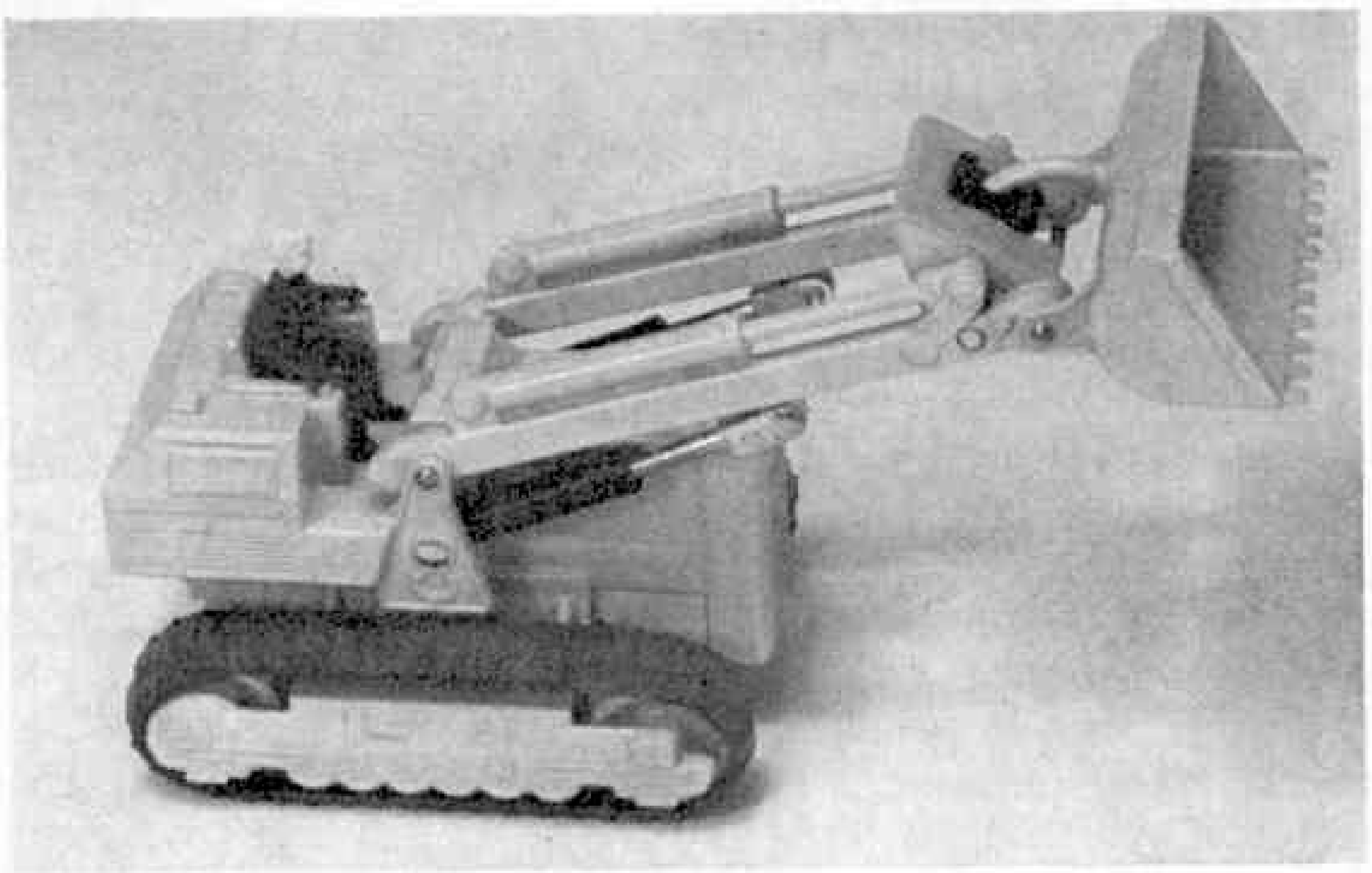
## Two New Models from MATCHBOX

To add to the 'Models of Yesteryear' range, "Matchbox" have introduced a model of the 1914 Prince Henry Vauxhall. We've always had a soft spot for vintage and veteran die-casts, and this particular one is a real beauty. Finished in maroon and silver with gold wheels, radiator and windscreen it manages to look well detailed without being fragile. Cream plastic seats finish off this gem which is priced at 7/-.



**The Prince Henry Vauxhall, one of the first true sports cars is re-produced well in model form by MATCHBOX.**

The second model is a completely different one to the first, being a Caterpillar 'Traxcavator'. Finished in bright yellow with working shovel mechanism and rubber tracks, it is reasonably detailed, having a driver in blue overalls sitting in the driving seat. Although strongly made we felt it was just a little lacking in eye-appeal although at 8/6 it represents fair value for money.



**An appealing working model for youngsters although somewhat lacking in detail is the new MATCHBOX Traxcavator.**

## New Revell Spacecraft

Yet another model of the APOLLO 11 Spacecraft is Revell's COLUMBIA and EAGLE to 1/96 scale. Containing forty parts, the two models built up easily into accurate little replicas. A sheet of gold foil is included for the Lunar Module. There is a large chunk of moon terrain.

The Lunar Module and an astronaut stand on this while the Common Module "hovers" above on a rather large stand, which would have looked better in transparent plastic. Excellent value at 15/5.

Also by Revell comes a bigger and more detailed model of the TRANQUILLITY BASE to 1/48th scale. Similar to the Monogram model (reviewed August issue) it is complete with gold foil, astronaut figures, moon surface, etc.

The two stages separate and the legs fold up or down. It equals the quality of the Monogram model and is a great deal cheaper at 19/9d.

No doubt this won't be the last bit of this subject that we'll see !

## car outline
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Fill in the form opposite and simply send it in to *Meccano Magazine*, Comp', 13-35 Bridge Street, Hemel Hempstead, Herts., marked "Car Outline Competition" or if you don't want to cut your magazine just jot down your answer on a postcard and *don't* forget your address!

The first 50 correct entries received will be sent a model of the vehicle illustrated.

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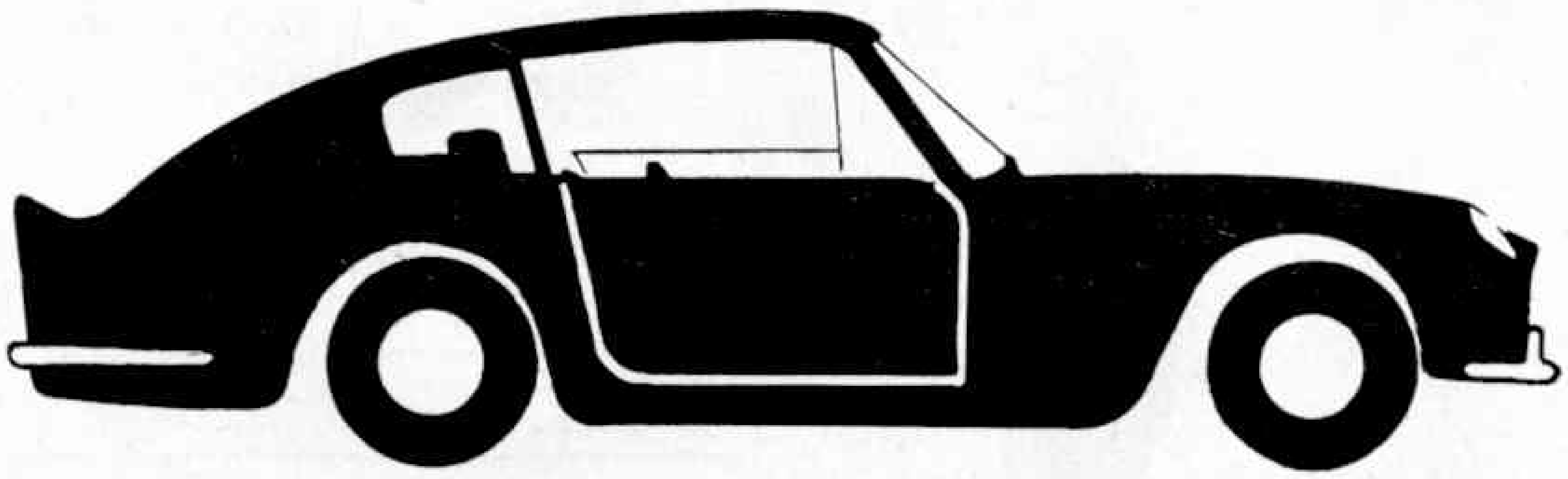

## DINKY TOY WINNERS!

Below is a list of the winners who correctly identified last month's silhouette and were the first to send their entries to the *Meccano Magazine* Office. To those of you whose entries were wrong, or didn't perhaps get them off to us quickly enough, don't despair, but have another try this month. The last month's car was, of course, a Jensen F.F.

Winners.

J. Wilson, Wirral, Cheshire. R. C. Leadbeater, Sutton Coldfield, Warks. N. Howes, Stockport, Cheshire. S. Rowsell, Newport, Mon. A. Foreman, Guildford, Surrey. R. Aist, Combe, Oxford. P. Elliott, Tynemouth, Northumberland. N. Pickering, Welwyn Garden City, Herts. J. Flynn, Newbury, Berks. M. Kerr, Chelmsford, Essex. R. Fletcher, Slough, Bucks. P. Davis, Great Milton, Oxford. D. Reed, Hemel Hempstead, Herts. S. Cross, Ipswich, Suffolk. P. Northway, Dunfermline, Fifes. D. Snuggs, Petersfield, Hants. R. Levg, Northenden, Manchester. T. Dodsley, Old Basford, Notts. P. Musgrove, Boxmoor, Herts. D. Dungworth, Sheffield, Yorks. R. Parkin, Hertford, Herts. A. Peacock, Hertford, Herts. K. Saunders, Southampton, Hants. A. Williams, Stratford-upon-Avon. S. C. Starkey, Heanor, Derby. I. Watts, Aylesbury, Bucks. J. Piper, Liskeard, Cornwall. S. Salmon, Winchester, Hants. S. R. Wolstenholme, Swinton, Manchester. P. Fisher, Cannock, Staffs. M. Bird, Hall Green, Birmingham. T. Franklin, Brighton, Sussex. G. Henwood, Wallingford, Berks. T. Baldwin, Nr. Honiton, Devon. I. E. Baker, Southsea, Hants. S. Wilson, Bradford, Yorks. A. F. Burr, Watford, Herts. C. Handle, Eastwood, Notts. I. H. Jones, Flint. P. Robertshaw, Shipley, Yorks. N. Jedynakiewicz, Birkenhead, Ches. P. Glynn, Birmingham. M. Tinker, Maidenhead, Berks. J. Manley, Bolton, Lancs. C. R. Weston, Cinder Hill, Notts. I. N. L. Teaz, Glasgow.

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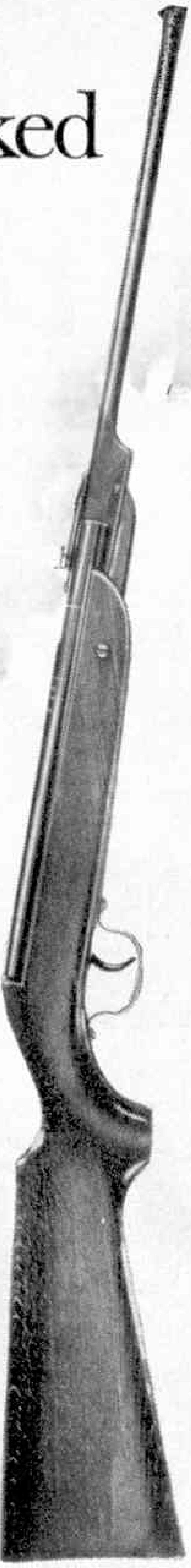

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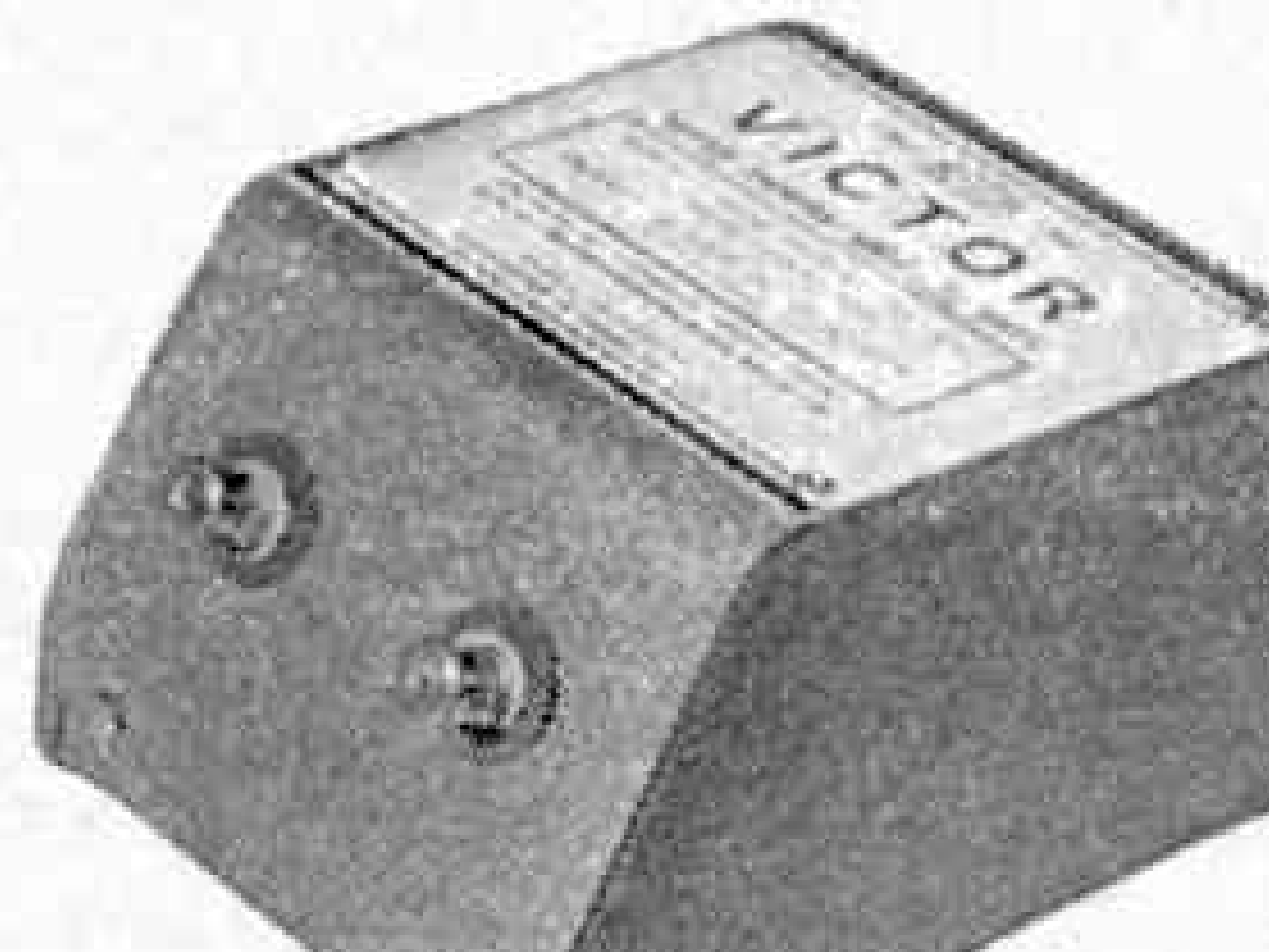

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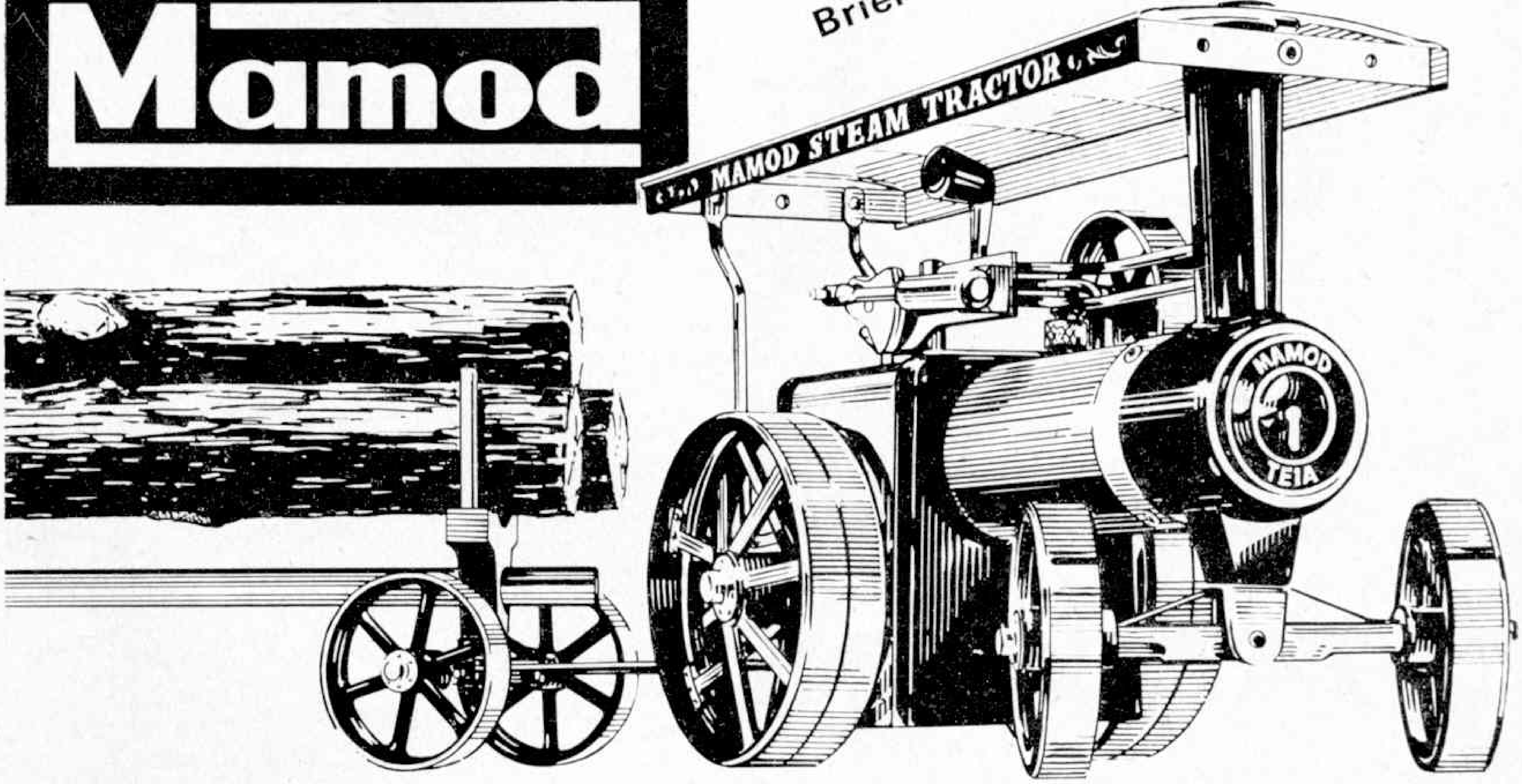

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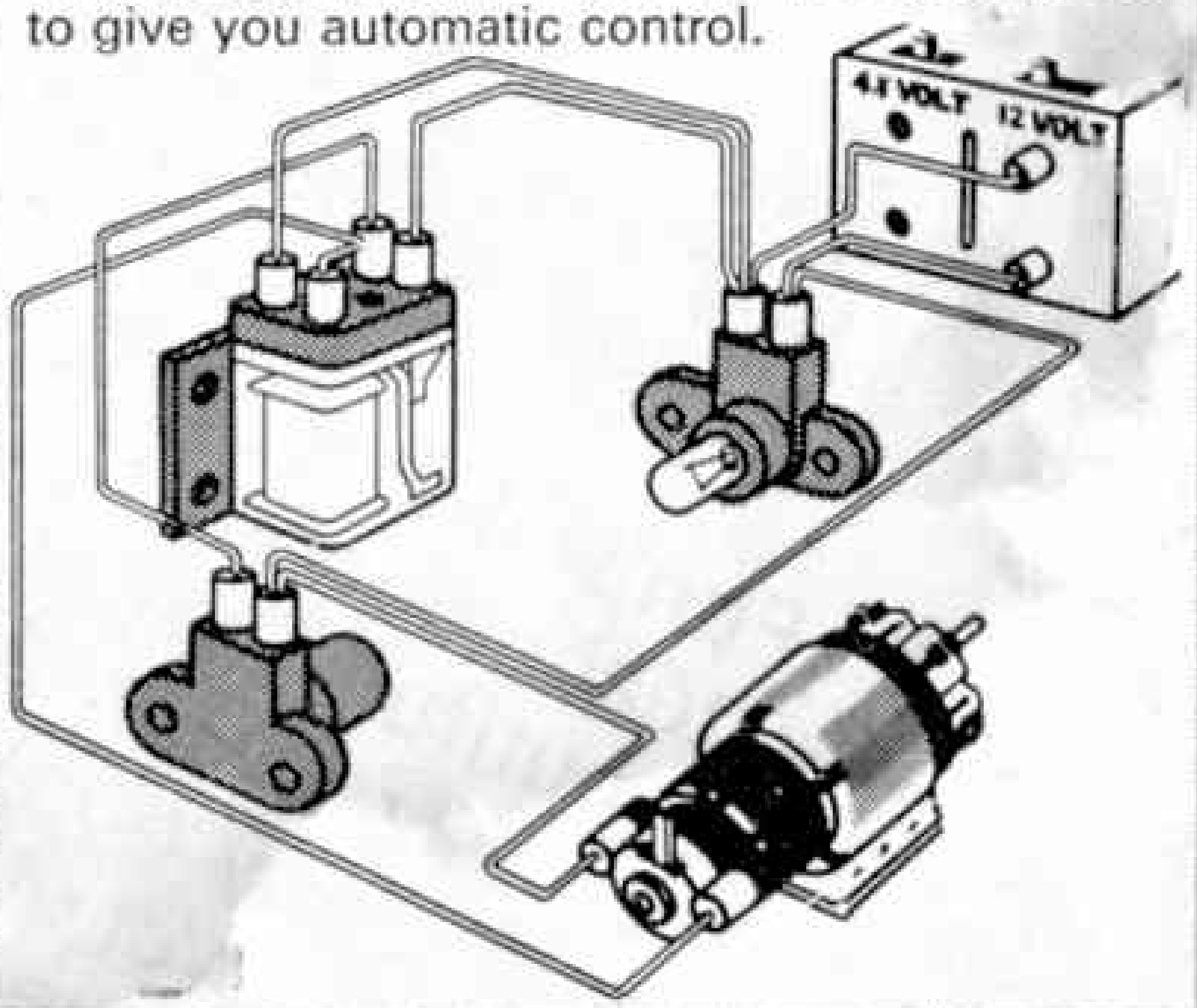

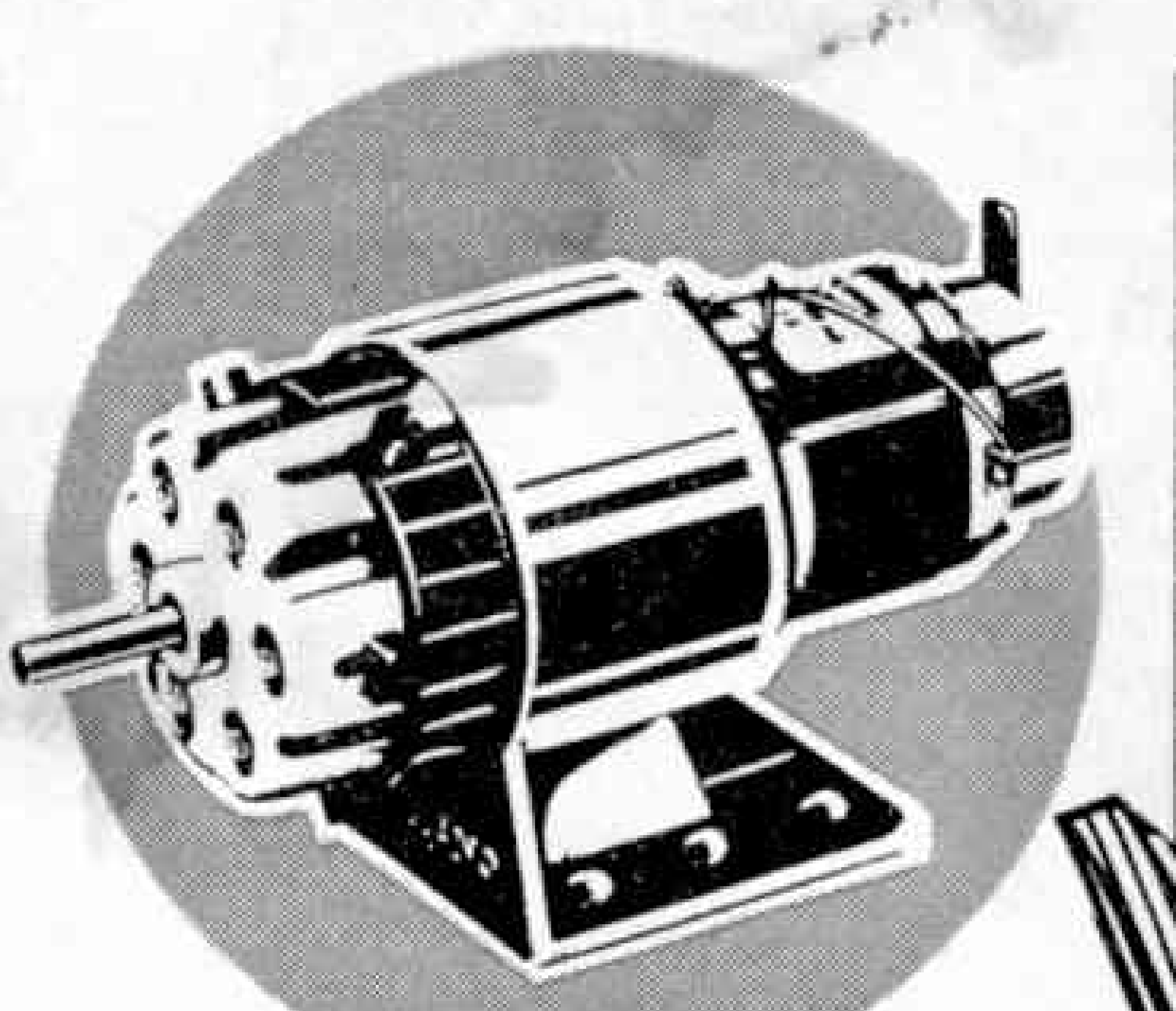

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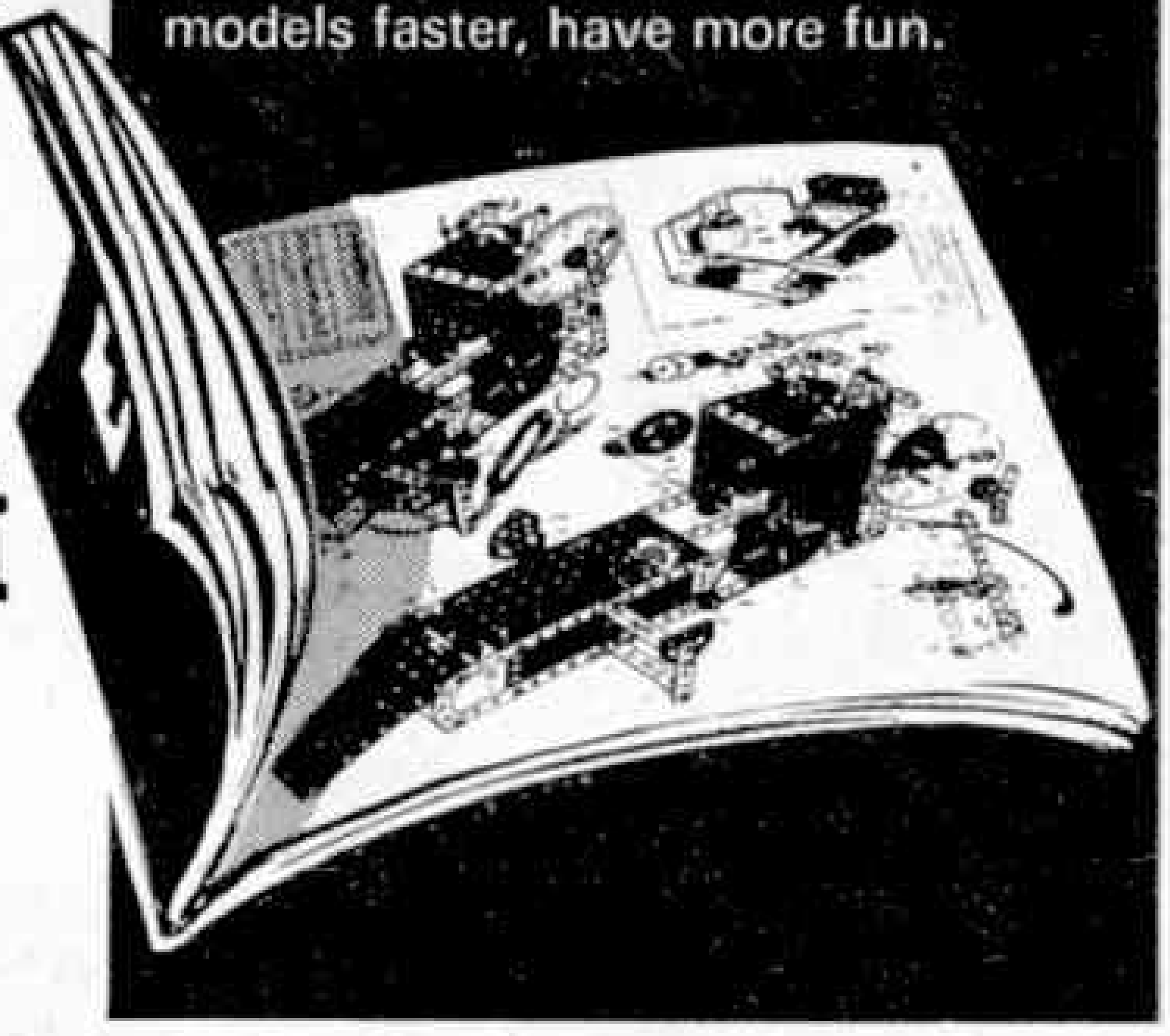

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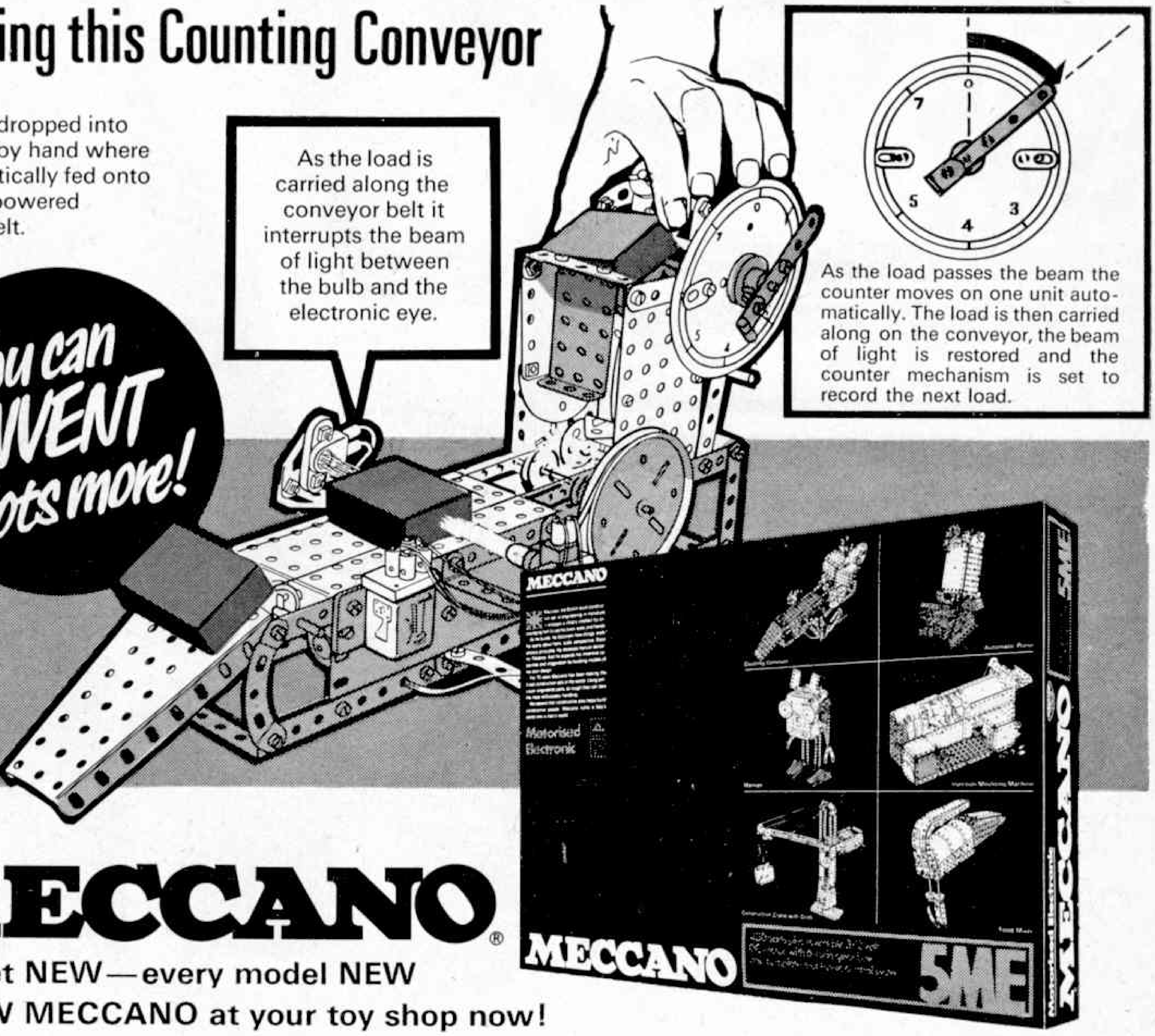

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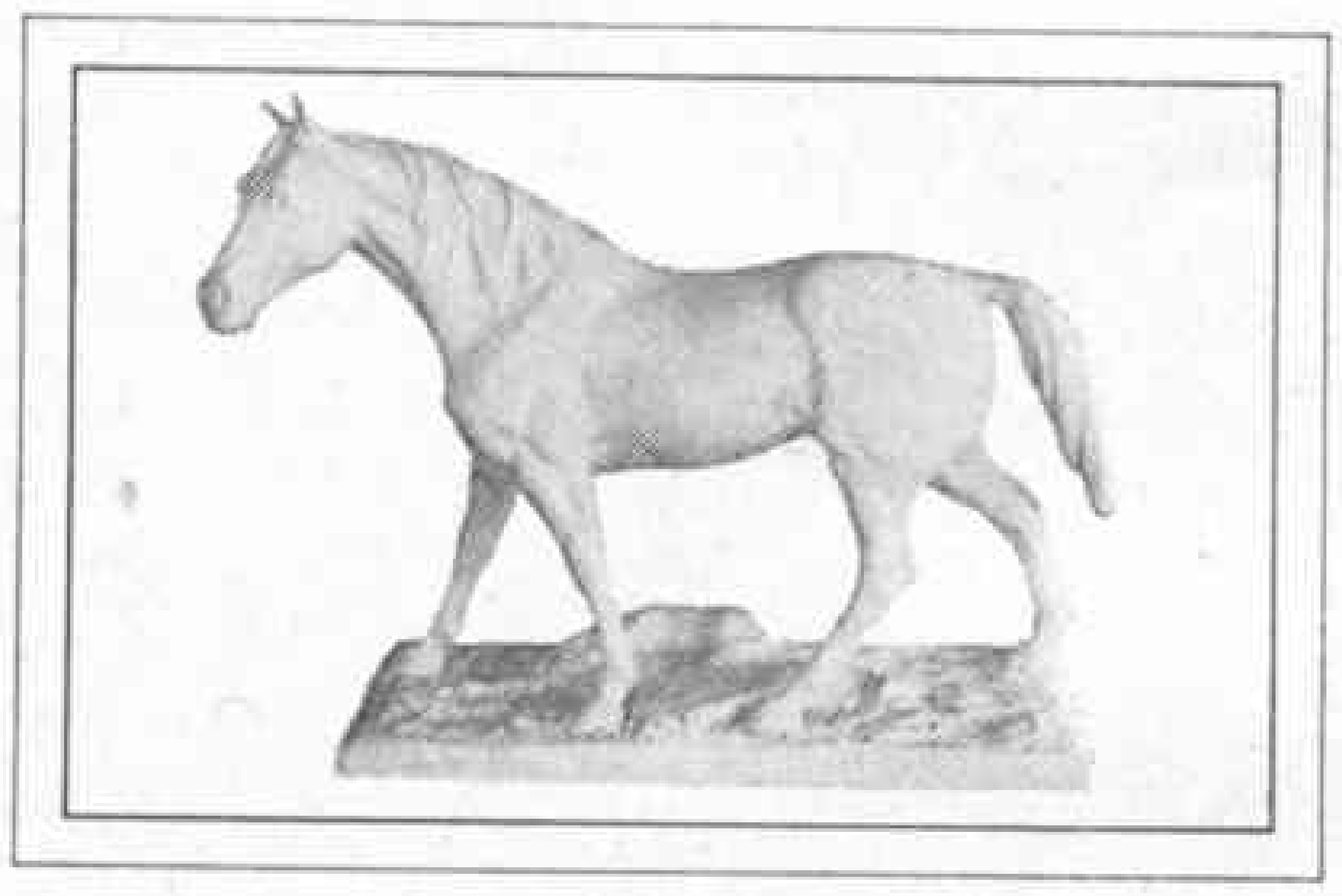

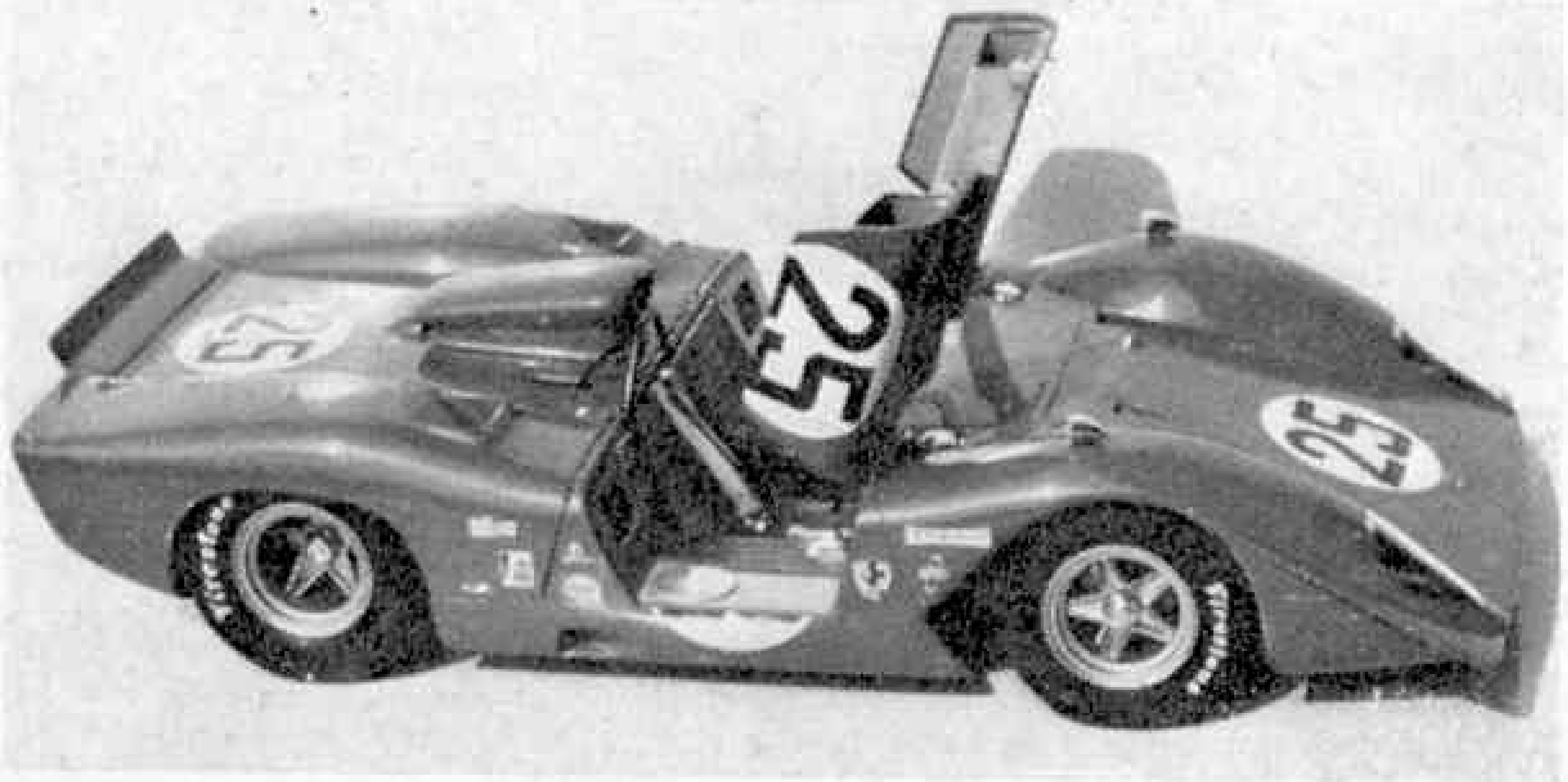

Highlights of the Christmas issue of Model Cars Magazine are a double portion of Prototype Parade 1/32nd scale plans—the Australian Elfin M.E.5 and the Formula 1 Flat 12 Ferrari. Construction features include an experimental 1/32nd scale chassis, more notes on modern steel frames and an article on how to build one from scratch and a piece by top 1/32nd scale racer, Phil Enos on his own personal approach to Formula 1 racing.

For collectors there's the Quiralu Story from Cecil Gibson together with Collectors Corner and Autominology: David Windsor's Racing Review provides a host of exclusive action photos of full size sports cars and there are more details of the breath-taking work of Italy's Michele Conti.

All the regular features such as Pit Chatter, Readers Write, E.C.R.A. Newspage and Club News etc., are also back and an exciting full colour Formula 1 March cover wraps up another fine three shillings worth.

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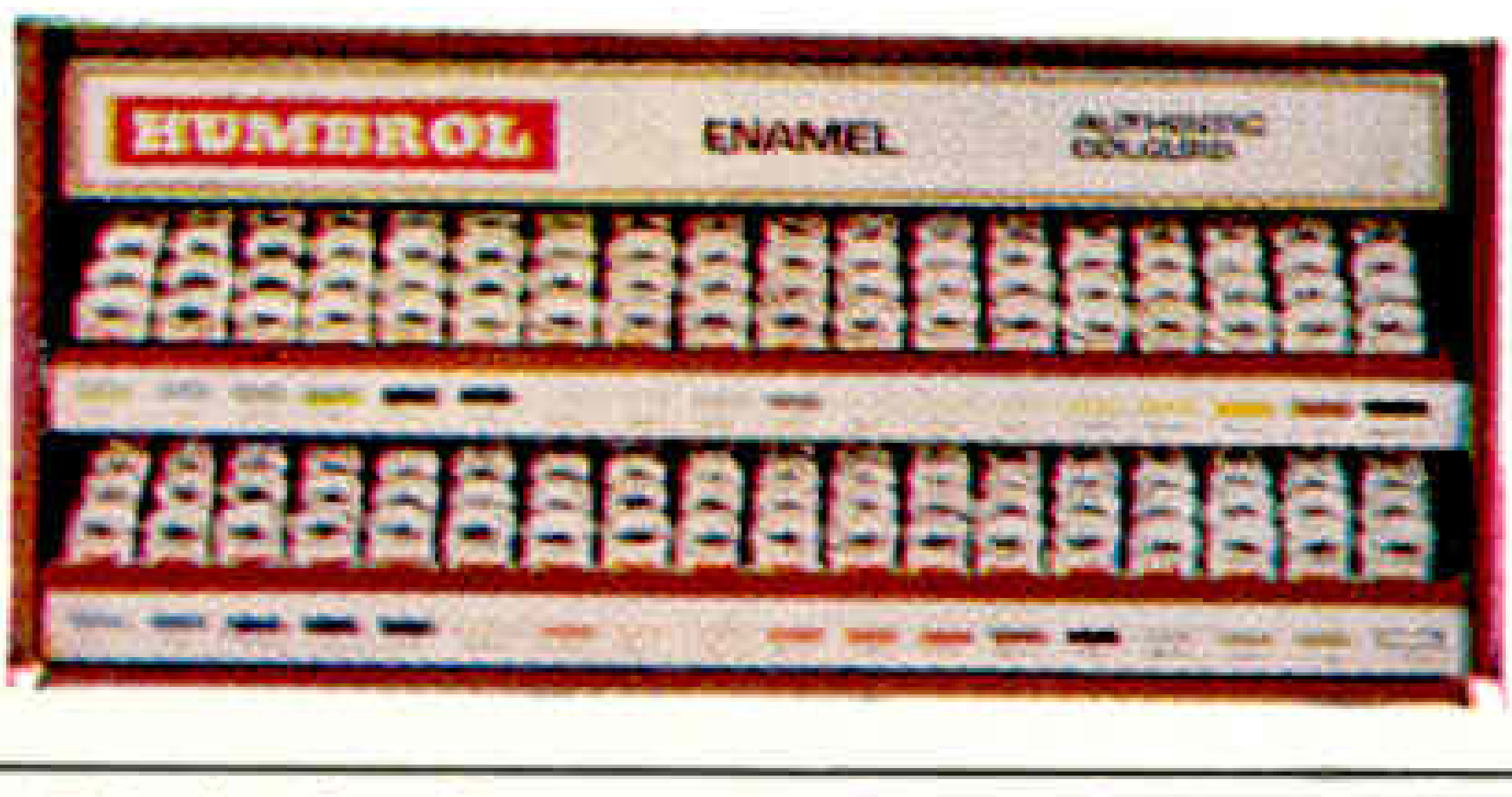

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*Printed by* ELECTRICAL PRESS LTD., *Maidenhead.*